The AUTOMOBILE

JUN 7
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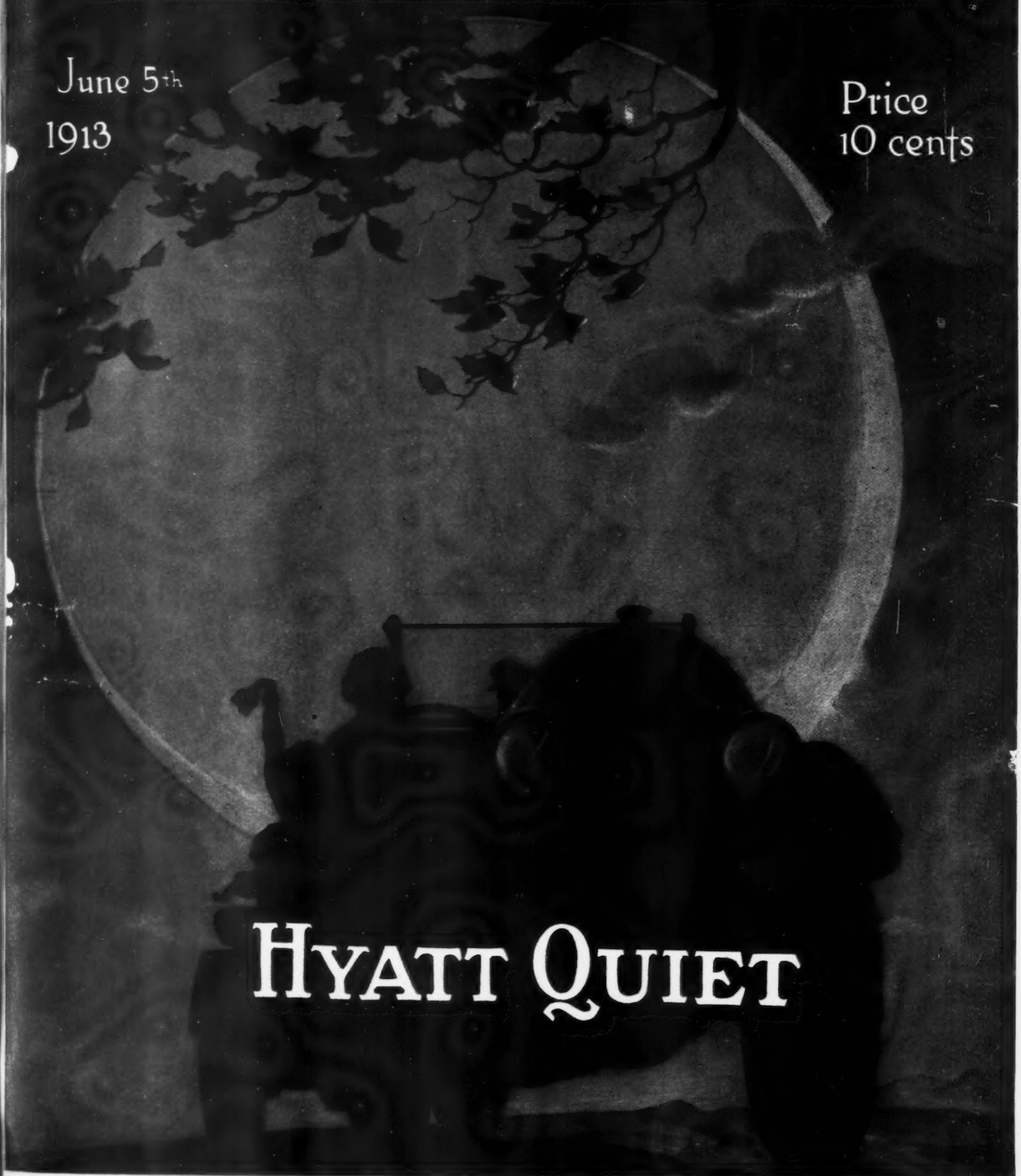
1913

Price
10 cents



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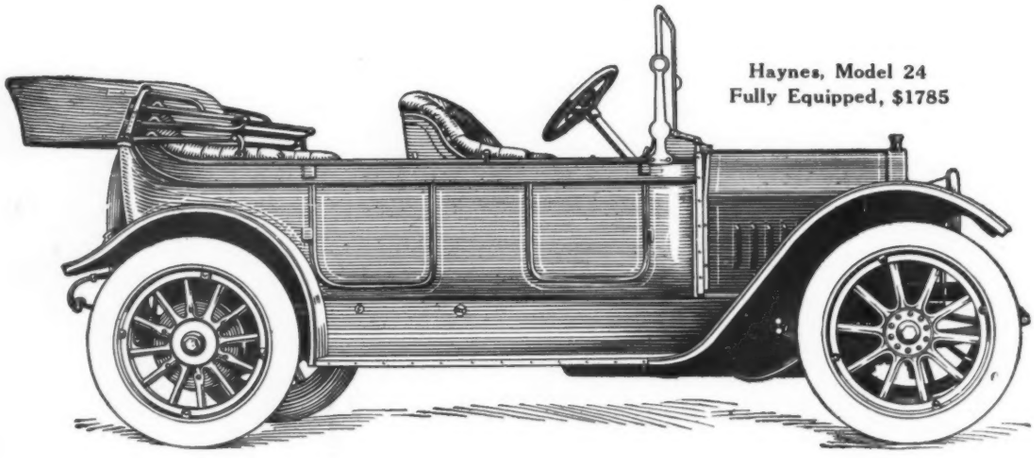

Haynes, Model 24
Fully Equipped, $1785

LOOKING at it from your view point, in choosing a line you will consider several things which are more important **to you** than the size of a manufacturer's factory, or how many **thousands** of cars he builds, or how many **talking points** he may have in **equipment.**

The Haynes factory (new plant built and completely equipped in 1911) has been called by authorities "one of the most efficient plants in the world." The Haynes output is large enough to earn minimum costs on parts and materials—not so large as to make Haynes cars **common.** Haynes equipment leaves **nothing** to be asked for.

But Haynes **Sincerity means more to you** and to your trade than these things mean.

Haynes sincerity is possible only in such an organization as this, where the original builder of the original Haynes of 1893 still is, and through all these years has been, at the head of the same organization; where the skilled machinists have **grown up** in the plant, inspired always by the Haynes spirit; where the same designing engineer has, for many years, worked out the logical development of the motor car; where every workman's wage is paid by the week and **not** by the piece; where for nearly a generation the business policy has been dictated by honesty of purpose and earnestness of effort.

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Model 24, four cylinder, 5-passenger touring - - - $1785
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HAYNES AUTOMOBILE COMPANY

503 Union Street **Kokomo, Indiana**

VOL. XXVIII NEW YORK—THURSDAY, JUNE 5, 1913—CHICAGO No. 23

The AUTOMOBILE

Goux, Peugeot, Wins $50,000 Race

World's Record Holder Covers Course at 75.92 Miles Per Hour—Race 14 Minutes Slower Than Last Year

INDIANAPOLIS, May 30.—Goux, Peugeot, France, are the three words on the lips of 96,000 automobile racing enthusiasts who gathered at the speedway in this city today to witness the 500-mile classic race for a purse of $50,000. Translated into motoring vernacular these mean that Jules Goux in his French Peugeot racing car vanquished the pick of America's speed pilots, defeated some of England's best known sons, laid the pride of Italy low, triumphed over the skill of Belgium's best and carried away all honors at today's great contest.

Starting in a field of twenty-seven, Goux piloted his special racing creation over the entire 500 miles at a speed of 75.94 miles per hour, between 2 and 3 miles per hour slower than the winning pace of a year ago. During the 200 circuits of the speedway he fought in turn with the picked drivers of the world, but finally won out with a margin of 13 minutes and 8 seconds over his nearest competitor and 1 hour and 21 minutes ahead of the tenth driver to finish and carry off a part of the $50,000 spoils.

Jules Goux, a youthful, slender Frenchman, had many contenders whom he fought with in turn on practically even terms until he had turned the 400-mile mark when he seemed to enjoy renewed life, shook off all other contenders and shot his fleet monster toward the 500-mile goal. His time was exactly 14 minutes slower than the pace set by Dawson in the winning National a year ago. Goux won three trophies, Remy Brassard, for leading at 200 miles, the Prest-O-Lite for leading at 300 miles and the Wheeler and Schebler for leading at 400 miles.

But if France was first and carried the coveted $20,000 to foreign shores, American brawn was well to the fore and captured second and third places for the Stars and Stripes, yielding fourth position to England, fifth to Belgium and the remaining five places to America.

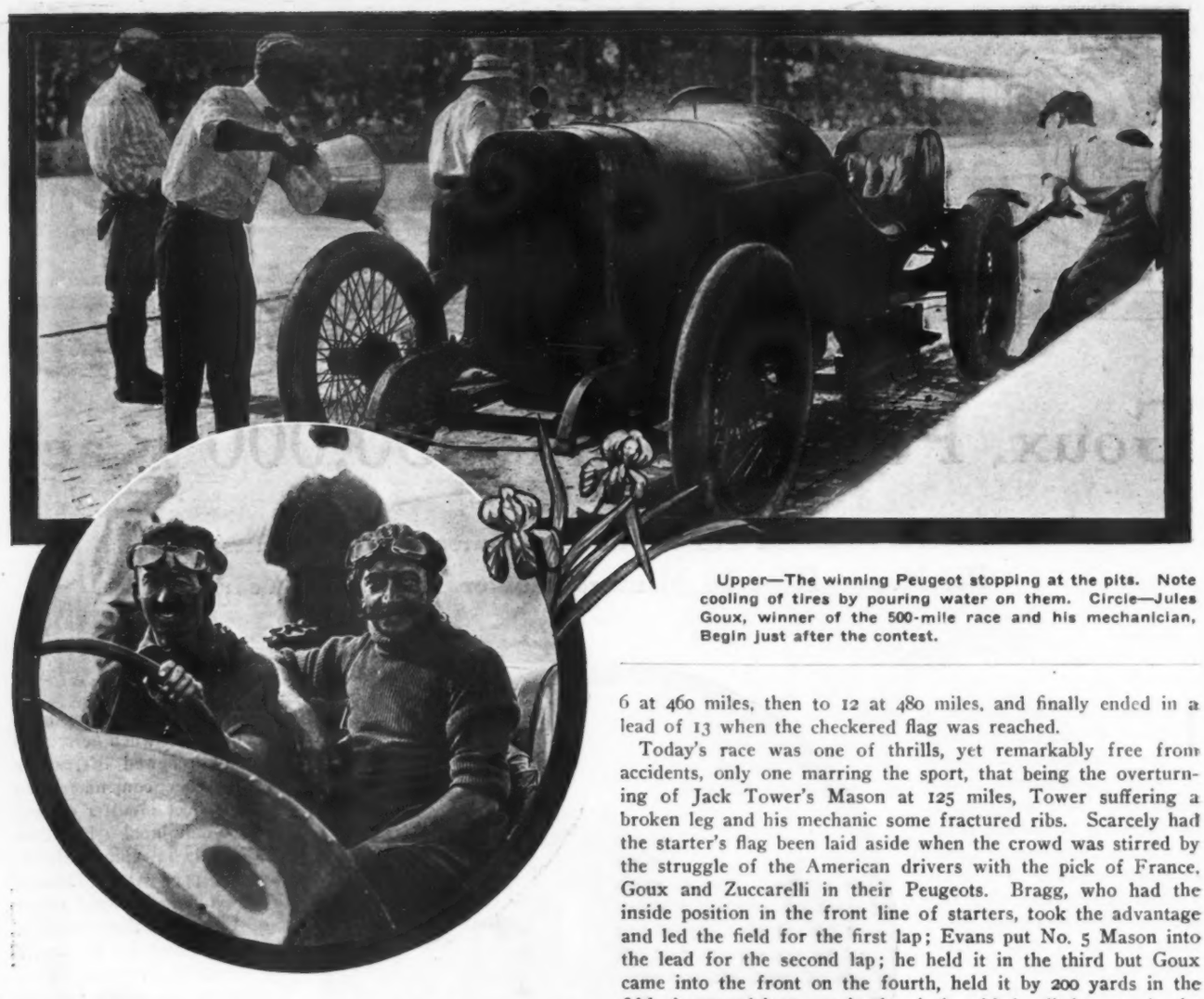
Spencer Wishart in a Mercer was second, traveling 73.49 miles per hour, nosing out his fellow-American, Charles Merz in a Stutz by the narrow margin of 36 seconds.

The English Sunbeam piloted by Guyot, a Frenchman, was fourth at 70.92 miles per hour, and fifth position went to Pilette of Brussels driving a Mercedes-Knight sleeve-valve motor entered by E. C. Patterson, the Chicago sportsman. The Mercedes-Knight, one of the smallest motors in the race,

Goux's Peugeot receiving the checkered flag as the winner

Dividers of the Spoils

NO.	CAR	DRIVER	TIME	M.P.H.	PRIZE
16	Peugeot	Goux	6:35:05.00	75.92	$20,000
22	Mercer	Wishart	6:48:13.40	73.49	10,000
2	Stutz	Merz	6:48:49.25	73.38	5.000
9	Sunbeam	Guyot	7:02:58.95	70.92	3,500
23	Mercedes-Knight	Pilette	7:20:13.00	68.14	3,000
12	Grey Fox	Wilcox	7:23:26.55	67.65	2,200
29	Mercedes	Mulford	7:28:05.50	66.95	1.800
31	Case	Disbrow	7:29:09.00	63.08	1,600
35	Mason	Haupt	7:52:35.10	63.47	1,500
25	Tulsa	Clark	7:56:14.25	62.99	1,400



Upper—The winning Peugeot stopping at the pits. Note cooling of tires by pouring water on them. Circle—Jules Goux, winner of the 500-mile race and his mechanician, Begin just after the contest.

250 cubic inches displacement in a 450-cubic inch class, averaged 68.14 miles per hour and made one of the most consistent performances of the day.

Five other cars finished, making ten in all to complete the five centuries. Their order was: Howard Wilcox in the Grey Fox, a special car built by C. P. Fox, an Indiana sportsman, speed 67.65 miles per hour; Ralph Mulford in a Mercedes, poppet-valve type, 66.94 miles per hour; Louis Disbrow, Case, 66.79 miles per hour; Willie Haupt, Mason, 63.48 miles per hour; and George Clark in a special car, the Tulsa, built by Oklahoma sportsmen, speed 62.98 miles per hour.

Only Eleven Cars Finished

Only one other car was running at the finish of the ten who divided the money among them, it being Bob Burman's Keeton which had led for many miles during the early hours of the contest but lost hours due to puncturing the gasoline tank, having to change carbureters and his carbureter catching fire.

Of the twenty-seven starters, sixteen fell by the wayside for one cause or another. The race, though slower, was a more enjoyable and fascinating one than that of a year ago, the slower pace not being recognized by the contestants because of the changing positions of the leaders until the 400-mile mark was reached, after which the Peugeot was never headed off and started opening a gap of 3 minutes between it and Gil Anderson's Stutz which disputed every mile of the race until eliminated at 460 miles when running in second place by a broken camshaft. From 3 minutes the gap grew to 4 at 440 miles, then to 6 at 460 miles, then to 12 at 480 miles, and finally ended in a lead of 13 when the checkered flag was reached.

Today's race was one of thrills, yet remarkably free from accidents, only one marring the sport, that being the overturning of Jack Tower's Mason at 125 miles, Tower suffering a broken leg and his mechanic some fractured ribs. Scarcely had the starter's flag been laid aside when the crowd was stirred by the struggle of the American drivers with the pick of France, Goux and Zuccarelli in their Peugeots. Bragg, who had the inside position in the front line of starters, took the advantage and led the field for the first lap; Evans put No. 5 Mason into the lead for the second lap; he held it in the third but Goux came into the front on the fourth, held it by 200 yards in the fifth, increased it to 400 in the sixth, added a little more in the seventh and gained some more in the eighth. With eight laps, 20 miles, covered, it looked as if the much-touted Goux was going to make a runaway of the day. But the hopes of his admirers were short lived for Burman, who was late reaching the starting line due to replacing a broken steering knuckle, and who got away at the tail end of the list, was getting his graceful Keeton under way and at 40 miles was leading the Frenchman by 2 minutes, Goux having blown a tire 20 minutes after the start and requiring 78 seconds to change his wheels with tires.

Burman a Possible Winner

Burman had his Keeton running perfectly, hitting over 100 miles per hour on the straightaway and coasting the turns. It looked as if his chances were good. At 60 miles he had 3 minutes' lead on the Frenchman with three other cars between him and Goux. At 80 miles he still led with over 3 minutes leeway, at 100 miles he retained a good margin; at 120 miles he still led, but fortune failed him, his carbureter caught fire, he lost nearly an hour and Goux took the lead at 140 miles with Anderson's Stutz, Mulford's Mercedes and Guyot's Sunbeam all bunched 3 minutes behind him. Once more it seemed Goux's chance to pull away if his tires would only hold up. They did and he led for another 100 miles until pushed out of position at 240 miles by the Anderson Stutz and Mulford in the Mercedes. At 260 miles the Frenchman got the premier position back with a margin of less than a minute. Mulford and Anderson hung on with the desperation of demons. At 300 miles Goux had opened a gap of scarcely 2 minutes on Anderson but

at 320 Anderson was back in front with 23 seconds on the Peugeot.

But fortune changed and positions went up and down. Goux took the lead at 340 miles and held it to the end. For 120 miles Anderson's Stutz hung onto him with determination that warmed the heart and fired the enthusiasm of every American who watched the gladiators, and until a broken part robbed him of a well-earned second place when but 30 miles from the finish.

Anderson and Goux in a Duel

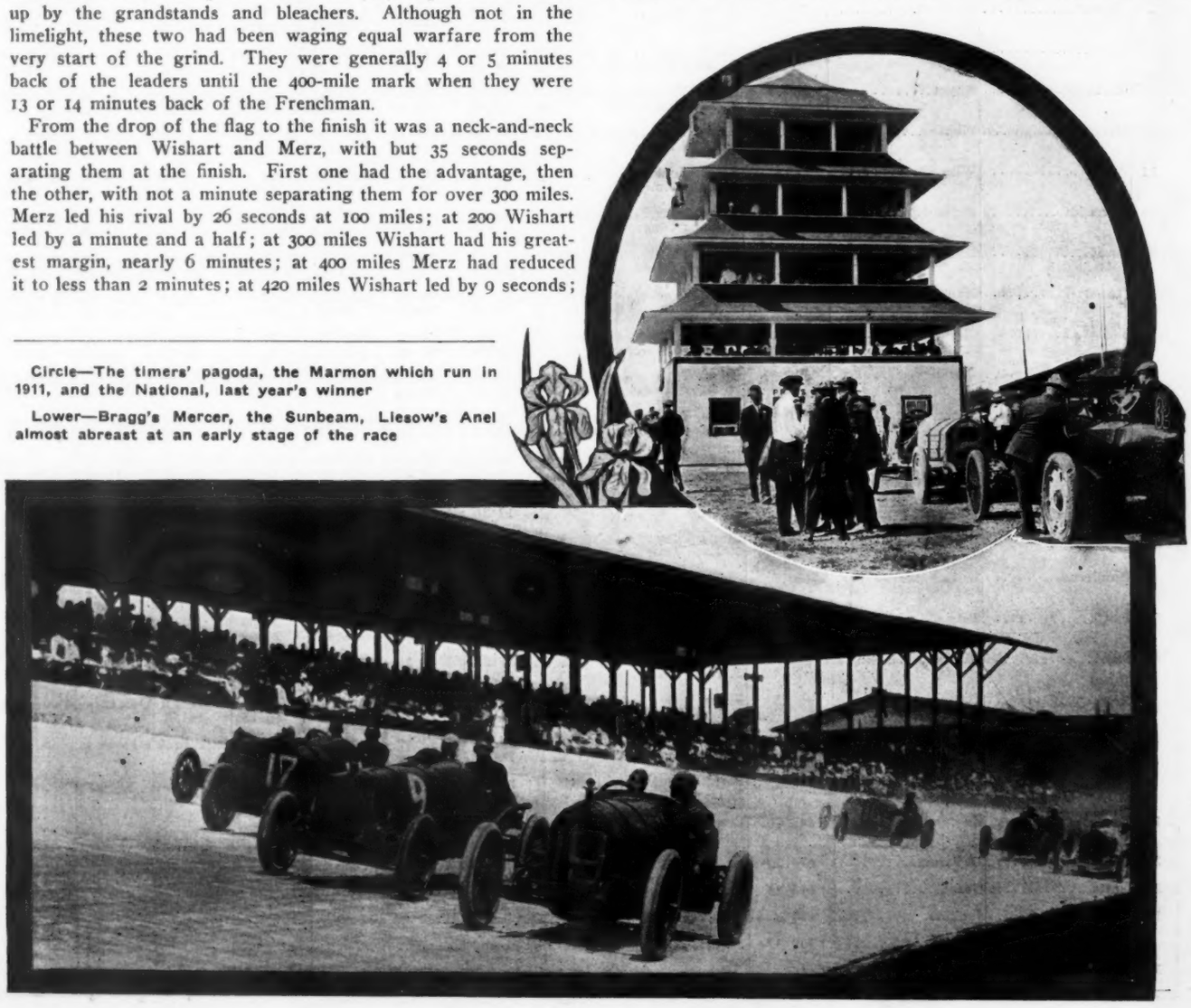
Anderson and Goux were battling in a class by themselves 8 to 10 minutes ahead of the remainder of the field. It was a noble fight, with odds favoring the special Peugeot, the prize-winner for the tricolor a year ago. When Anderson coasted into the pits, lifted the hood of his motor, gave a few turns of the starting crank and then pushed his white racing machine back a pall of gloom fell over the countless thousands. America's best fighter had given away to a foreign foe and the public looked to new leaders for America. Hopes were placed on Wishart's Mercer and Merz's Stutz running scarcely a minute apart. But they were 12 minutes behind the flying Goux and with scarcely 20 miles to go there was little hope of victory. Goux counted on tire trouble, but with expert pit aid he scarcely lost a minute to a change, he saw the race was won, he slackened his pace and won easily.

With first position settled, the fierce duel between Wishart and Merz for second position and the $10,000 purse was taken up by the grandstands and bleachers. Although not in the limelight, these two had been waging equal warfare from the very start of the grind. They were generally 4 or 5 minutes back of the leaders until the 400-mile mark when they were 13 or 14 minutes back of the Frenchman.

From the drop of the flag to the finish it was a neck-and-neck battle between Wishart and Merz, with but 35 seconds separating them at the finish. First one had the advantage, then the other, with not a minute separating them for over 300 miles. Merz led his rival by 26 seconds at 100 miles; at 200 Wishart led by a minute and a half; at 300 miles Wishart had his greatest margin, nearly 6 minutes; at 400 miles Merz had reduced it to less than 2 minutes; at 420 miles Wishart led by 9 seconds; at 440 miles he was 58 seconds up; at 460 it was 51 seconds, at 480 but 29 seconds, and then 35 seconds apart. Merz's finish was spectacular in the extreme. Just as he got the green flag, meaning that he started his last lap, flames burst out under the bonnet at each side. Simultaneously the cry went up "He is on fire." All looked for him to stop, but, never slackening his pace, Merz sped for the finish. Up the back stretch the flames could be seen gaining headway. Everybody wondered if he could make it, wondered if the insulation on his wires would bring him to the tape or if second or third position would be snatched from him as was De Palma's lot a year ago. Every eye followed the white racer around the far turn, back of the bushes and then into the home stretch. The flames brightened but Merz held his pace and as he shot over the line with the mechanic vainly endeavoring to keep the flames under the hood he was given a cheer that rarely is accorded to a third-place car. The 35 seconds meant $5,000, the difference between second and third places.

Sunbeam Pleased I. A. E. Men

The Sunbeam, winning fourth place, gave all the visiting English engineers, the guests of the American Society of Automobile Engineers, a chance to wave their Union Jacks from a private stand erected for them close to the timers' pagoda. The running of this car was one of the consistent features of the race. Guyot put it into fourth place at 60 miles and held it in fourth, fifth, sixth or seventh position until 400 miles when he



Circle—The timers' pagoda, the Marmon which run in 1911, and the National, last year's winner

Lower—Bragg's Mercer, the Sunbeam, Liesow's Anel almost abreast at an early stage of the race

moved into fourth and held it to the finish. The car, with its long bottle-shaped black body, moved with the utmost ease, its long wheelbase handicapping it slightly on the turns. Guyot never pushed it. He was playing the safe game from start to finish, being determined to end within the money, of which he eventually carried off $3,500. He changed but one tire from start to finish.

Mercedes-Knight Very Consistent

If the consistency of the Sunbeam was noteworthy that of the Mercedes-Knight was more so. It being the first Knight-type motor to be seen in a race of any nature in America its performance was watched with the utmost interest. It had a piston displacement of 250 cubic inches as compared with 450 of the Peugeots. Pillette, who sells the car in Belgium, started on a 75-mile an hour clip. He started in eighteenth position; at 100 miles he was tenth; at 200 miles he was ninth; at 300 he was seventh; at 400 miles seventh, and at the finish fifth. So consistent was his work that everybody felt from the start he would finish well up in the money. He finished 45 minutes after Goux. At 100 miles he was 4 minutes back of Goux; at 200 miles 16 minutes; at 300 miles he was 21 minutes back, and at 400 miles 29 minutes.

A contender all through the race and one who might have finished in second or third place had he not carelessly run out of gasoline on the backstretch and lost half an hour getting a supply from the grandstand, was Ralph Mulford in No. 29 Mercedes. Mulford made one of the greatest runs of the day in that he did not change a tire from start to finish and did not make a stop until the race was more than half over. He was a leading contender until the race was past the 400-mile mark when he dropped from third to seventh and was not able to regain his lost advantage. Mulford was in fourth place at 100 miles; at 200 miles he was third; at 240 miles he was second, being less than 2 minutes back of Anderson's Stutz leading at that time; at 300 miles he was fourth, and at 400 miles he was

TABLE SHOWING TIME OF CARS IN 500-MILE SWEEPSTAKES AT 20-MILE

No.	Car	Driver	Dis-placement	Lap: / Miles:	8 / 20	16 / 40	24 / 60	32 / 80	40 / 100	48 / 120	56 / 140	64 / 160	72 / 180
16	Peugeot	Goux	448	Elaps. Time	15:17	33:25	49:53	1.04:40	1.19:23	1.34:06	1.48:48	2.06:21	2.21:13
				20 Laps Time		18:08	16:28	14:47	14:43	14:43	14:42	17:33	14:52
22	Mercer	Wishart	299.7	Elaps. Time	16:26	34:56	50:31	1.06:13	1.21:49	1.37:27	1.53:56	2.08:41	2.25:06
				20 Laps Time		18:30	15:35	15:42	14:36	15:38	16:23	14:45	16:25
2	Stutz	Merz	399.97	Elaps. Time	16:20	35:59	49:58	1.05:47	1.21:23	1.36:37	1.52:14	2.07:40	2.20:04
				20 Laps Time		19:39	13:59	15:49	15:36	15:14	15:37	15:26	18:24
9	Sunbeam	Guyot	380.8	Elaps. Time	16:29	32:17	48:11	1.04:02	1.20:02	1.36:01	1.51:49	2.07:39	2.23:47
				20 Laps Time		15:48	15:54	15:51	16:00	15:59	15:48	15:50	16:08
23	Mercedes-Knight	Pilette	251.33	Elaps. Time	16:49	35:08	51:18	1.07:29	1.23:36	1.39:54	2.00:39	2.17:43	2.34:44
				20 Laps Time		18:19	16:10	15:11	16:07	16:18	20:45	17:04	17:01
12	Fox	Wilcox	389	Elaps. Time	16:17	31:36	50:22	1.09:53	1.27:22	1.43:02	1.58:50	2.14:36	2.30:41
				20 Laps Time		15:19	18:46	19:31	17:29	15:40	15:48	15:46	16:05
29	Mercedes	Mulford	440.8	Elaps. Time	16:27	32:16	48:08	1.03:48	1.19:33	1.35:31	1.51:29	2.07:17	2.22:56
				20 Laps Time		15:49	15:52	15:40	15:45	15:58	15:58	15:48	14:39
31	Case	Disbrow	449	Elaps. Time	17:45	33:57	49:47	1.05:36	1.21:52	1.38:05	1.54:40	2.11:30	2.33:26
				20 Laps Time		16:12	15:50	15:49	16:16	16:13	16:35	16:50	21:56
35	Mason	Haupt	350.5	Elaps. Time	15:46	32:19	50:22	1.10:23	1.57:53	2.15:11	2.32:02	2.50:10	3.18:39
				20 Laps Time		16:33	18:03	20:01	47:30	17:18	16:51	18:08	28:29
25	Tulsa	Clark	340.1	Elaps. Time	18:10	35:14	52:00	1.11:11	1.27:50	1.48:01	2.06:12	2.27:15	2.45:25
				20 Laps Time		17:04	16:46	19:11	16:39	20:11	18:11	21:03	18:10
3	Stutz	Anderson	399.97	Elaps. Time	16:19	32:17	48:55	1.04:14	1.19:26	1.36:19	1.51:49	2.07:09	2.22:30
				20 Laps Time		15:58	16:38	15:19	15:12	16:53	15:30	15:20	15:21
4	Keeton	Burman	387	Elaps. Time	16:06	31:10	46:13	1.01:24	1.16:35	1.32:03	2.27:41	3.03:43	3.18:10
				20 Laps Time		15:04	15:03	15:11	15:11	15:28	15:38	36:02	14:27
5	Mason	Evans	350.5	Elaps. Time	16:52	32:02	50:09	1.15:58	1.31:40	1.47:11	2.08:15	2.26:25	2.42:24
				20 Laps Time		15:10	18:07	25:49	15:42	15:31	21:04	18:10	15:59
17	Anel	Liesaw	318.1	Elaps. Time	16:20	33:56	49:54	1.08:32	1.24:34	1.40:30	1.57:44	2.25:50	2.42:16
				20 Laps Time		17:36	15:58	18:38	16:02	15:56	17:14	28:06	16:26
19	Mercer	Bragg	424.36	Elaps. Time	16:15	32:40	49:29	1.53:55	2.12:33	2.27:50	2.47:41	3.03:11	3.18:48
				20 Laps Time		16:25	16:49	63:26	18:38	15:17	19:49	15:30	15:37
10	Henderson	Knipper	350.5	Elaps. Time	16:19	32:24	51:16	1.07:10	1.27:26	1.46:25	2.08:37	2.25:36	2.45:57
				20 Laps Time		16:05	18:52	15:54	20:16	18:59	22:12	16:59	20:21
27	Isotta	Tetzlaff	443.86	Elaps. Time	16:58	33:02	49:22	1.05:07	1.21:09	1.37:10	1.53:05	2.13:00	2.29:16
				20 Laps Time		16:04	16:20	15:45	16:02	16:01	15:55	19:55	16:16
32	Case	Nikrent	448	Elaps. Time	16:08	31:22	46:26	1.05:50	1.22:09	1.37:44	1.53:34	2.09:17	Out 67th
				20 Laps Time		15:14	15:08	19:24	16:19	15:35	15:50	15:43	
6	Mason	Tower	350.5	Elaps. Time	16:03	40:40	58:06	1.16:04	1.31:22	1.48:15	Out, turned over, lap		51.
				20 Laps Time		24:37	17:26	17:58	16:18	16:53			
28	Isotta	Trucco	443.86	Elaps. Time	23:09	36:28	52:17	1.07:55	Out; gas tank broke loose, lap 39.				
				20 Laps Time		13:19	15:49	15:38					
1	Nyberg	Endicott	389	Elaps. Time	19:31	1.13:32	Out lap 39, broke gearset shaft.						
				20 Laps Time		54:01							
15	Peugeot	Zuccarelli	448	Elaps. Time	16:13	31:14	Out lap 18, burned main bearing.						
				20 Laps Time		15:01							
21	Mercer	DePalma	424.36	.....	15:47	Out lap 15, burned out bearing.							
26	Isotta	Grant	443.86	.....	15:55	Out lap 14, loose gas tank.							
18	Schacht	Jenkins	410.6	.....	18:26	Out lap 13, broke crankshaft.							
8	Stutz	Herr	399.97	.....	Out lap 7, broke clutch shaft.								
33	Case	B. Endicott	449	.....	Out lap 1, broke drive shaft.								

third. Soon after came his downfall, by a shortage of gasoline. His tank held 40 gallons and was filled at the start. At 275 miles 20 gallons were added but he ran out at 440 miles. His falling from third place moved Wishart and Merz up and when later Anderson, who was running second, fell out Wishart and Merz were moved up to second and third positions. Mulford won $1,800; had he held his place he might have been second with $10,000. It was costly gasoline.

Today's race had more than its share of troubles with cars due to a general lack of preparedness. They had not been driven enough, the parts were not well enough worn in. As a result, bearing troubles were many. Of the sixteen to fall out, at least five had troubles traceable to burned-out bearings. The Shacht broke a crankshaft; Stutz No. 3 broke a camshaft; De Palma's No. 2 Mercer burned out a bearing; Zuccarelli in No. 15 Peugeot, a duplicate of the winner, burned out a motor bearing; Nikrent's Case lost a bearing, and the Anel withdrew because of loose connecting-rod bearings.

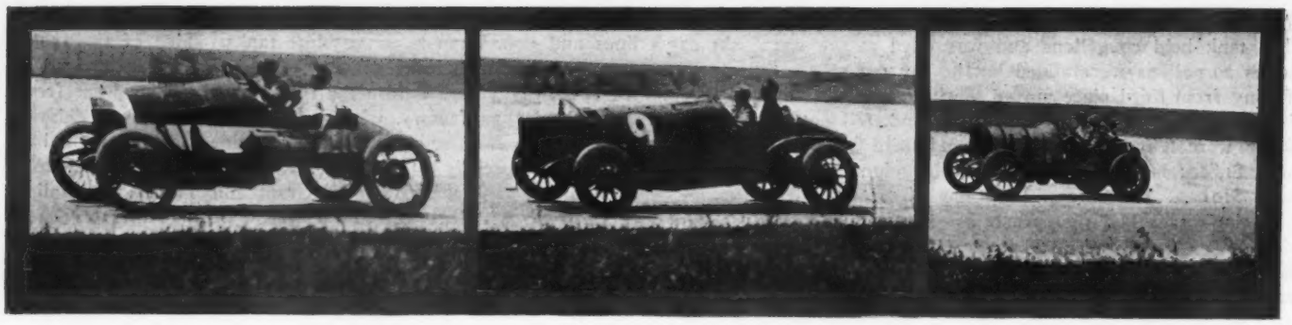
Next to bearing troubles came those due to faulty gasoline lines and poor support of gasoline tanks. Two of the Isotta cars went out with leaky gasoline tanks. These cars arrived at the speedway 3 days before the race started. They were fresh from the Italian factory, where their manufacture was delayed by a strike. The bodies with the gasoline tanks in them had been built specially at an outside factory. The rivets tore through the tank walls. Harry Grant and Trucco, the Italian driver, both withdrew for this trouble. Burman in the Keeton had gasoline troubles and changed carbureters during the race, putting on a Rayfield in lap fifty-seven. Mulford had more or less gasoline trouble from the start of the race.

Peugeot's Pit Well Managed

A measure of the glory accruing to Goux and the Peugeot car should be awarded to the excellent management of the repair pit. The Peugeot team was fortunate in having as its manager John Aitken, of National fame, whose experience in racing as a

INTERVALS FROM START TO FINISH, WITH THE TIME FOR EACH 20 MILES

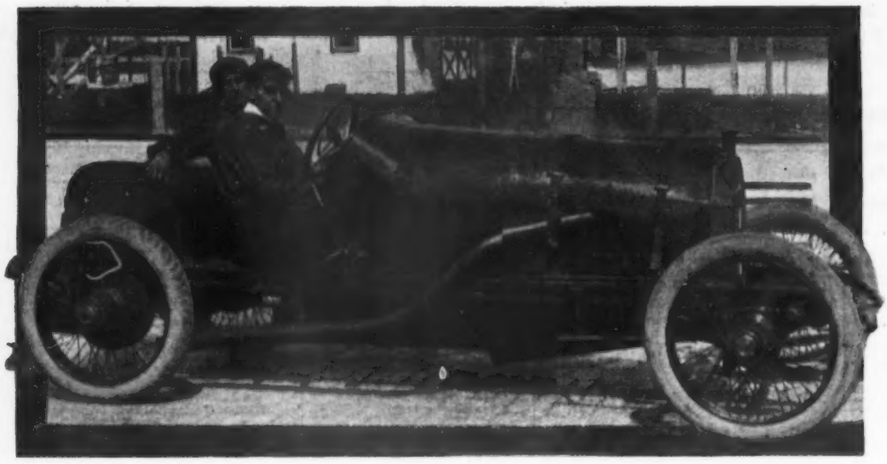
80 200	88 220	96 240	104 260	112 280	120 300	128 320	136 340	144 360	152 380	160 400	168 420	176 440	184 460	192 480	200 500	Miles per Hour
2.36:07 14:54	2.50:58 14:51	3.09:49 18:51	3.24:34 14:45	3.39:27 14:53	3.56:59 17:32	4.14:00 17:01	4.28:04 14:04	4.44:17 16:13	4.59:22 15:05	5.14:35 15:13	5.31:20 16:45	5.47:33 16:13	6.02:35 15:02	6.19:00 16:25	6.35:05.00 16:05.00	75.94
2.41:24 16:18	2.50:04 17:40	3.14:52 15:48	3.30:12 15:20	3.45:53 15:41	4.01:32 15:39	4.19:06 17:34	4.36:33 17:27	4.55:09 19:36	5.11:44 16:35	5.27:33 15:49	5.43:40 16:07	6.00:33 16:53	6.16:21 15:48	6.31:57 15:36	6.48:13.40 16:16.40	73.50
2.43:02 16:58	2.50:15 15:13	3.13:22 15:87	3.30:11 16:49	3.50:48 20:37	4.07:48 17:00	4.23:23 15:35	4.41:26 18:03	4.57:17 15:51	5.13:18 16:01	5.28:47 15:29	5.44:23 15:36	6.01:31 17:08	6.17:12 15:41	6.32:35 15:23	6.48:49.25 16:14.25	73.39
2.40:07 16:20	3.01:05 20:58	3.17:02 15:57	3.33:29 16:27	3.57:27 23:58	4.11:44 14:17	4.28:12 16:28	4.42:44 14:32	4.59:29 16:45	5.20:55 21:26	5.37:47 16:52	5.54:29 16:42	6.11:39 17:10	6.28:15 39:36	6.45:31 17:16	7.02:58.95 17:27.95	71.00
2.51:49 17:05	3.09:05 17:16	3.26:13 17:08	3.43:32 17:19	4.00:44 17:08	4.17:57 17:13	4.34:48 16:51	4.51:53 17:05	5.08:49 16:56	5.26:05 17:16	5.43:05 17:00	5.59:54 15:49	6.17:52 17:58	6.34:46 16:54	6.52:00 17:14	7.20:13.00 28:13.00	68.14
2.48:42 18:01	3.04:45 16:03	3.28:44 23:59	3.49:48 21:04	4.07:33 17:45	4.25:52 18:19	4.46:33 20:41	5.10:39 24:06	5.26:28 15:49	5.42:30 16:02	5.58:42 16:12	6.16:30 17:48	6.33:28 16:58	6.51:03 17:35	7.07:12 16:09	7.23:26.55 16:14.55	67.65
2.38:32 15:36	2.54:00 15:28	3.09:30 15:30	3.25:03 15:33	3.45:21 20:18	4.03:41 18:20	4.20:45 17:04	4.35:37 14:52	4.51:32 15:55	5.08:47 17:15	5.26:47 18:00	5.43:31 16:44	6.31:59 48:28	6.53:44 21:45	7.11:06 17:22	7.28:05.50 16:59.50	66.94
3.13:46 40:20	3.30:32 16:36	3.46:34 16:02	4.02:30 15:56	4.18:16 15:46	4.38:36 20:20	4.55:50 17:14	5.12:52 17:02	5.29:19 16:27	5.46:18 16:59	6.01:19 15:01	6.18:27 17:08	6.35:10 16:43	6.51:57 16:47	7.12:02 20:05	7.29:09.00 17:07.00	66.79
3.34:33 15:54	3.50:20 15:47	4.06:17 15:57	4.26:05 19:48	4.51:27 25:22	5.06:42 15:15	5.26:49 20:07	5.41:45 14:56	5.58:45 17:00	6.16:58 18:13	6.32:20 16:22	6.48:08 15:48	7.04:00 15:52	7.19:36 15:36	7.35:49 16:13	7.52:35.10 16:46.10	63.48
3.05:62 20:27	3:23.47 17:55	3.41:24 17:37	4.04:28 23:04	4.22:33 18:05	4.40:24 17:51	4.58:00 17:36	5.18:05 20:05	5.35:47 17:42	5.53:36 17:49	6.14:42 21:06	6:33.46 19:04	6.52:44 18:58	7.13:27 20:43	7.35:04 21:37	7.56:14.25 21:10.25	62.98
2.37:66 15:26	2.53:13 15:17	3.08:27 15:14	3.25:14 16:47	3.41:08 15:54	3.58:04 16:56	4.13:37 15:33	4.29:33 15:56	4.48:27 18:54	5.13:22 15:20	5.39:30 16:08	5.54:49 15:19	6.12:36 17:47	6.37:48 15:12	Out lap 187		
3.33:10 15:00	4.07:40 34:30	4.56:17 48:37	5.09:16 12:59	5.24:05 14:49	5.39:46 15:41	4.59:45 19:59	6.14:24 14:39	6.35:42 11:18	6.50:50 15:08	7.08:16 17:26	7.23:03 14:47	7.36:00 12:57	7.52:37 16:37	Running at	finish.	
2.57:55 15:31	3.20:36 22:41	3.36:44 16:08	3.52:49 16:05	4.08:45 15:56	4.24:19 15:34	4.40:25 16:06	5.00:11 19:46	5.16:16 16:05	5.32:27 16:11	Out lap	158.					
2.50:37 16:21	3.12:53 14:16	3.29:20 16:27	3.45:49 16:29	4.07:16 21:27	4.27:23 20:07	4.46:42 19:19	5.04:50 18:80	5.22:29 17:39	Out lap	148, loos	e connect	ing rod.				
3.34:33 15:45	3.52:37 18:04	4.12:57 20:20	4.28:47 15:50	4.44:12 15:25	5.01:35 17:23	5.15:05 13:30	Out lap	128, twis	ted pum	pshaft.						
3.02:43 16:46	3.36:16 33:33	4.20:34 44:18	4.43:37 23:03	5.16:50 32:13	5.42:32 15:42	Out lap	125, slip	ping clut	ch.							
2.47:10 17:54	3.03:10 16:00	3.19:17 16:07	3.36:23 17:06	3.52:01 15:38	Out lap	118, brok	e chain a	nd disqu	alified.							
Out 67th	lap.															



Pilette in the Mercedes-Knight

Guyot in the Sunbeam

Wilson in the Gray Fox



A snap shot of Jenkins in his Schacht, taken just before the great contest began

driver on the Speedway and in pit work helped him to make an efficient organization in the French quarters. He was assisted materially in his efforts by Charles Faroux, consulting engineer of the Peugeot factory.

It was a matter of question as to the effect wire wheels would have on tire wear and it was expected that this year's race would be of some value in determining just how the wire wheels would affect the life of the casings in the race. However, the results of the race are not such that any definite statement can be made either for or against wire wheels as tire savers. Of the ten cars which finished, three of them were equipped with wire wheels and all three were well up in the money. The winner, Goux, Wishart, who took second, and Pilette, who captured fourth money rode on wire wheels, the others using wood. The Sunbeam used the demountable type.

There were a few breaks of parts that were quite unlooked-for. Two of the Masons and the Henderson had troubles with slipping clutches. Tetzlaff's Isotta broke a driving chain on the home stretch. The driver and mechanic pushed the car into the pits only to be disqualified for pushing a car on the course. Bragg twisted off a pumpshaft on his Mercer at 325 miles. H. Endicott, driving the Nyberg, withdrew under 100 miles because of the reverse shaft in the gearbox seizing. Tower's Mason skidded and upset at 125 miles. Burman, with all his trouble, had the only car to be running at the finish of the race when ten cars had completed the course and taken all of the prizes. For consistent work he and his car deserve credit.

Haupt and his Mason as they looked before the race

The elimination of cars started early in the race. Six contestants dropped out before 100 miles were covered, these being Schacht, Grant's Isotta, DePalma's Mercer, Zuccarelli's Peugeot, Endicott's Nyberg and Trucco's Isotta.

Between 100 and 200 miles two more withdrew, Tower's Mason upsetting and Nikrent's Case withdrawing.

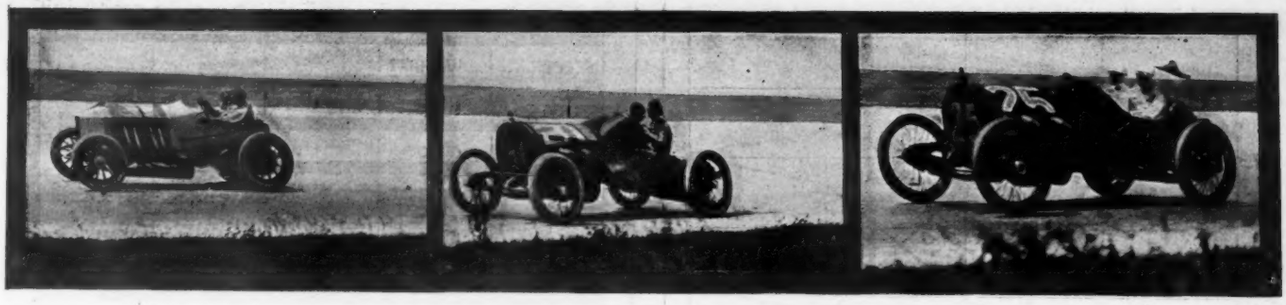
Between 200 and 300 miles only one fell out, Tetzlaff's Isotta.

Between 300 and 400 miles a Waterloo occurred, four withdrawing, namely, Henderson, Bragg's Mercer, the Anel and No. 5 Mason.

Between 400 and 500 miles only one fell by the wayside, it being the most pathetic of the race, No. 3 Stutz, driven by Gil Anderson, when it was in second position.

Wire wheels played a greater part in today's race than in any previous race in this country. Four different makes were in the race, Rudge-Whitworth, McCue, Frayer and Riley. The winning Peugeot used French-made Rudge-Whitworth detachables; No. 22 Mercer used American-made Rudge-Whitworths; and No. 23 Mercedes-Knight, finishing fifth, used English-made Rudge-Whitworths. No. 31 Case used McCue wire wheels; No. 35 Mason used Rudge-Whitworth, and No. 25 Tulsa used the McCue type of wheel. In recapitulation six of the ten cars to finish were equipped with wire wheels. Burman's Keeton, running at the finish, used McCue wire wheels and of the other contestants the three Isottas used the Riley wire wheels. It is impossible to state the accurate report of tires on wire and wool wheels with the object of gauging the relative merits of wood and wire wheels.

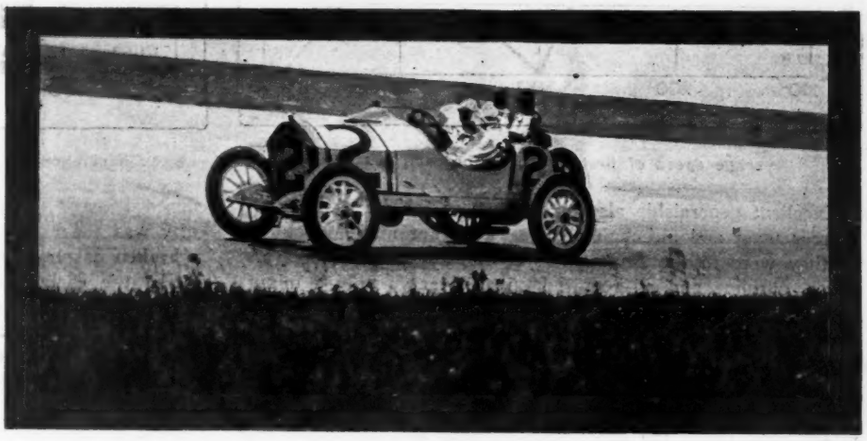
The tire story continues to be one of the engrossing ones of a big race. Owing to the cool weather preceding the race and the cool rains the bricks of the speedway were cooler than usual, but still much tire trouble developed. The right rear wheels suffered the most. Then came the left rear and lastly the right front. The left front tires gave little if any trouble. Goux, using Firestones, changed nine, five on the right rear, two on the left rear and two on the right front. The left front tire went through the race and was little worn at the finish. The big reason for wearing out the



Mulford in Mercedes | Case with Wisbrow driving | Clark driving Tulsa

right rear was because of getting off the smooth oiled center of the track. The rear wheels invariably slipped on the oily stretches and the dry, rough bricks tore the treads clean off several tires as the wheels spun around at great speed.

The most remarkable tire performance of the day were the Braender tires on Mulford's Mercedes. These are single-cured wrapped tread tires, made in Rutherford, N. J. By single cure is meant that the carcass and tread portion of the tire are all vulcanized together in one process, whereas in many tires there are two curing processes. Mulford's rear tires did not have a mark on them at the end of the 500 miles. There was one short cross-cut in the right front.



Stutz car rounding one of the banks, with Merz at wheel

Various other makes of tires were represented in the race. No. 22 Mercer, which won second place, used Michelins in front and Firestones in rear. No. 2 Stutz used Michelins all around. No. 9 Sunbeam used English Dunlops and changed but one during the entire race. No. 23 Mercedes-Knight used Michelins. No. 12 Fox used Michelins.

Practically all of the contestants used shock-absorbers in front and rear, some contenting themselves with one set of four but many others putting on two sets or eight in all. Hartfords were in general use with a few of other makes. Both Peugeots used eight Hartfords each. The Mercer used a set of four Hartfords and on the Stutz finishing third were two Hartfords in front and four in rear. The Sunbeam used four Hartfords in front and a hydraulic set in rear. The winning Peugeot used Bosch ignition and a Claudel carbureter.

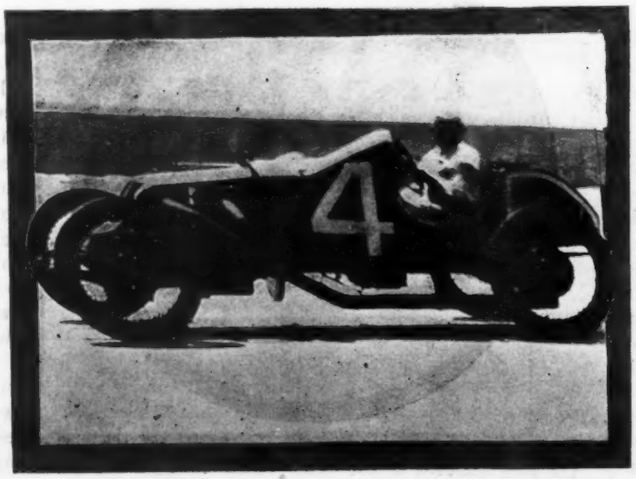
Some conception of the relative performances of the ten cars completing the race can be gained from the accompanying table, which gives their piston displacement and the speed in miles per hour that they averaged. The Peugeot was right up to limit and so was the Case.

These were the only cars to exceed the 400 cubic inch mark, the limit set by the rules being 450 cubic inches. No. 28 Mercer, and No. 23 Mercedes-Knight were the smallest capacity motors in the race, the Mercer 299 and the Mercedes-Knight 251. It would be possible to use a 400-cubic-inch limit next year and have practically as fast a race as that run this season.

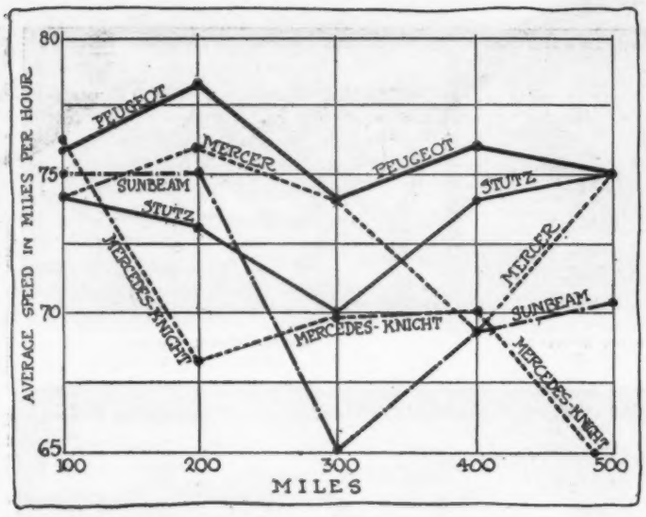
No.	Car	Piston Displacement	Speed
16,	Peugeot	448	75.92
22,	Mercer	299.7	73.49
2,	Stutz	399.97	73.38
9,	Sunbeam	380.8	70.92
23,	Mercedes-Knight	251.33	68.14
12,	Grey Fox	389	67.65
29,	Mercedes	440.8	66.95
31,	Case	449	63.08
35,	Mason	350.5	63.47
25,	Tulsa	340.1	62.99

To the Stutz team belongs the palm for quick and efficient pit work and to the men in the Stutz repair pit must be given a great measure of credit for the excellent showing made by Merz's car. In the matter of tire changes particularly did Stutz teamwork show up brilliantly. Tire changes were made in 30 seconds flat in some instances. The average time required to change the tires on the Stutz car was about 45 seconds and opportunity was taken during this time to renew the supplies of gasoline, oil and water.

This showing was due not only to the training of the pit men but also to the preparation and arrangements that had been provided for fast work. For instance, the jack used was a long wooden lever which lifted the wheels clear of the ground with one movement, an iron strap acting as a catch which was released by a kick and let the wheels which had already been started spinning down on the ground. Another feature of the preparation was the special funnels which could be dropped into the filler opening and the can of gasoline or oil up-ended into them without wabbling.



Burman's Keeton going over 100 miles an hour



Average speed of first five cars for each 100 miles

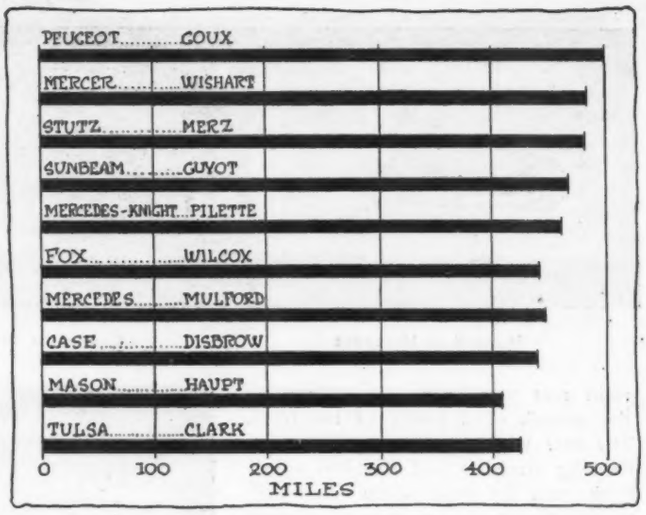


Chart showing positions of cars when Goux finished

Excellent generalship also was shown in the pit work of the Mercer team and although changes were not made as quickly as they were in the Stutz pits, yet stops for tire change and water, gasoline and oil required on an average only a minute and a quarter. The Mercer people had some difficulty with their jacks.

The Peugeot had a method of jacking that made for quick changes when two tires were to be replaced on either the rear or front axle. With this, a single jack of the long lever type was slipped under the differential housing and the entire rear axle lifted in one operation so that both the right and left tires could be changed simultaneously. The first stop of this car consisted of changing both rear tires and taking on gasoline and oil and the car was on the road again in 1 minute and 43 seconds. The Peugeot pit was ably managed by John Aitken, of National fame, assisted by Charles Faroux, consulting engineer of the Peugeot factory.

So far as mechanical troubles were concerned there were five cars that came through with clean scores and four of these were the ones that finished 1, 2, 3, 4 in the race. Goux' Peugeot, the Mercer 22, the Sunbeam and Clark's Tulsa did not have to stop at any time during the 500 miles for mechanical adjustments.

The only difficulty encountered by the Sunbeam was in the sticking of the hub-retaining nut when one wheel was to be replaced. The Mercedes-Knight came very close to finishing without difficulty but on its last few laps had a stuck float valve. Pilette diagnosed the trouble as due to the magneto and wasted considerable time before discovering that the fault was in the carbureter.

Troubles with the gasoline connections seemed to be the most frequent of any of the mechanical difficulties. The extreme vibration of the cars over the brick track at high speed played havoc with gasoline tanks and piping. In several instances flexible conduit had been employed to lead the gasoline from the tank to the carbureter but this conduit seemed to break with as great frequency as did the stiff copper tubing ordinarily employed. The pounding of the cars started the rivets in the gasoline tanks and caused leakage in several of them. In fact, this very difficulty was the cause of the withdrawal of two of the Isottas. A broken gasoline lead held up the Fox Special for 3 minutes during the early part of the race. The No. 10 Henderson, along with its other difficulties, had trouble with a break in the flexible conduit which led the gasoline from the tank to the carbureter. Burman's Keeton also developed a leak in the gasoline tank but a wad of chewing gum plugged up the hole successfully.

Next to difficulties with the gasoline line, slipping clutches were the most frequent cause of trouble. The Henderson was forced to spend nearly 20 minutes altogether in trying to adjust the clutch so that it would hold. Frequent applications of gasoline with a squirt gun were necessary and every few laps the treatment had to be repeated. Knipper, a large portion of the time before his withdrawal, was on his back under the car. The difficulty was relieved temporarily by driving in pieces of saw blade in the leather facing. Disbrow's Case also was bothered with a slipping clutch and lost 2 or 3 minutes on this account. The Mason No. 35 made eight stops after running about 200 miles, on account of clutch slipping. The saw blades wedged into the facing gave temporary relief but slipping continued in less aggravated form.

There was not as much trouble with valves and valve operating mechanism this year as during last year's race in spite of the fact that the motors were run at a higher speed than they were a year ago. Wilcox's Fox Special had to replace a rocker arm in one cylinder and had to change exhaust valves in two cylinders. No. 3 Stutz broke its camshaft which was the only mechanical difficulty it had. It put the car out. Liesaw's Anel had valve trouble and the exhaust valve had to be changed. It was found necessary to adjust the rocker arms on Trucco's Isotta and occasion was taken to try to remedy the leak which was beginning to show itself in the gasoline tank. The gasoline continued to leak.

Carbureter troubles affected several of the cars and this difficulty was the only one which Mulford encountered throughout the race, one stop being made necessary by a slight carbureter adjustment.

Tower's Mason, which turned over in lap 51. This was the only accident of the race. Tower suffered a broken leg and his mechanician some fractured ribs—C.N.E.

Burman's chief difficulty was occasioned by carbureter troubles and he lost 21 minutes in changing carbureters shortly after noon. This, together with another 21-minute stop to fix the gasoline tank, lost him his position of leader which he had held up to that time and dropped him down to sixteenth place. Knipper's Henderson had to stop twice, losing in all 7 minutes on account of carbureter adjustments.

Difficulties with the steering gears occurred in only two instances, Disbrow's Case losing a nut off the tie-rod bolt and Burman having to replace a bushing on the steering gear. Burman's trouble was to be expected in as much as he had broken a steering gear twice in practice and his final adjustments on a front axle that had just been put in that morning made him late at the start of the race.

The $20,000 handshake of Goux and Begin, as the winners congratulated each other after the race—C.N.E.

Lubrication troubles, while they were not the direct cause of any of the stops at the pits, were responsible for some of the difficulties already enumerated. The burned-out bearings on Nikrent's Case, Zuccarelli's Peugeot, DePalma's Mercer, and Harry Endicott's Schacht probably all can be laid to insufficient lubrication.

Eighty-eight new tires were worn out during the race. This means an outlay for tire equipment along of between $3,000 and $4,000. Tires were eaten up more rapidly this year than in previous speedway races because the day was warm and because there were oily spots on the track in which the tires spun and rasped the treads.

The ten cars which finished together with the two contenders, Anderson's Stutz and Burman's Keeton, used in all fifty-eight casings. These were divided among the four wheels as follows: right rear tires, twenty-nine; left rear tires, eleven; right front tires, twelve, and left front tires, three.

Disbrow's Case was nearly as fortunate as Mulford's Mercedes, making the complete run with only one tire change. The Tulsa, driven by Clark, wore out only two tires. The Sunbeam, fitted with demountable wooden wheels, replaced three tires. Goux's Peugeot wore out seven tires in all, three on the right rear, two on the left rear and two on the right front wheel. Wishart's Mercer made the run with five tire changes. Merz changed as many tires as did Goux, but lost only 5 minutes. The Peugeot lost 10 minutes. Pilette ground off the tread of one of his tires when running off an oily spot and stopped for a change. At the same time he took the precaution of replacing the other three tires, although they showed no signs of wear. Later in the day he stopped for another tire change, rather than run the risk of blowing out. The Fox Special ate up seven tires, losing less than 6.5 minutes. Haupt's Mason had to replace six tires, four of which were on the right rear wheel, losing 5 minutes. Anderson's Stutz held the record.

POSITIONS OF CARS EVERY EIGHT LAPS OR 20 MILES IN THE 500-MILE INDIANAPOLIS RACE

No.	Car	Driver	Miles: 20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500
16	Peugeot	Goux	1	13	9	5	2	2	1	1	1	1	1	3	1	1	1	2	1	1	1	1	1	1	1	1	1
22	Mercer	Wishart	16	16	15	10	9	8	8	6	6	5	5	5	6	5	4	4	4	4	3	4	3	3	3	3	2
2	Stutz	Merz	14	19	11	8	7	6	5	5	5	6	4	4	4	4	5	5	5	5	4	5	5	4	4	2	3
9	Sunbeam	Guyot	17	8	4	3	5	4	4	4	4	4	6	6	5	7	6	6	6	6	6	6	6	5	5	4	4
23	Mercedes-Knight	Pilette	18	17	17	12	11	11	12	11	10	9	9	8	8	8	7	7	7	7	7	7	7	6	6	5	5
12	Fox	Wilcox	10	4	14	15	13	13	11	10	8	8	8	9	10	10	9	9	10	10	9	8	8	8	7	6	6
29	Mercedes	Mulford	15	6	3	2	4	3	2	3	3	3	3	2	2	3	3	3	3	3	2	3	4	7	9	7	7
31	Case	Disbrow	21	15	8	7	8	10	9	8	9	14	13	13	12	12	11	11	11	11	10	9	9	9	8	8	8
35	Mason	Haupt	2	9	13	16	18	18	17	16	16	16	15	14	14	14	13	13	13	13	12	11	11	11	11	10	9
25	Tulsa	Clark	22	18	18	17	15	16	13	15	13	13	12	12	13	13	12	12	12	12	11	10	10	10	10	9	10
4	Keeton	Burman	6	1	1	1	1	1	16	18	15	15	17	17	17	16	14	14	14	14	13	12	12	12	12	Running when race was called.	
3	Stutz	Anderson	12	7	5	4	3	5	3	2	2	2	2	1	3	2	2	1	2	2	5	2	2	2	2	Out 188 Lap—469 Miles.	
5	Mason	Evans	19	5	12	18	17	15	14	14	12	10	11	11	11	11	8	8	8	8	8	Out 158 Lap—395 Miles.					
17	Anel	Liesaw	13	14	10	14	12	12	10	13	11	11	10	10	9	9	10	10	9	9	Out 148 Lap—370 Miles.						
19	Mercer	Bragg	9	11	7	20	19	19	18	17	17	17	16	15	15	15	15	15	Out 128 Lap—320 Miles.								
10	Henderson	Knipper	11	10	16	11	14	14	15	12	14	12	14	16	16	17	16	Out 125 Lap—312.5 Miles.									
27	Isotta	Tetzlaff	20	12	6	6	6	7	6	9	7	7	7	7	7	6	Out 118 Lap—295 Miles.										
32	Case	Nikrent	7	3	2	9	10	9	7	7	Out 67 Lap—167.5 Miles.																
6	Mason	Tower	5	21	20	19	16	17	Out 51 Lap—127.5 Miles.																		
28	Isotta	Trucco	25	20	19	13	Out in 39 Lap—97.5 Miles.																				
1	Nyberg	Endicott	24	22	Out 23 Lap—57.5 Miles.																						
15	Peugeot	Zuccarelli	8	2	Out 18 Lap—45 Miles.																						
21	Mercer	DePalma	3	Out 15 Lap—37.5 Miles.																							
26	Isotta	Grant	4	Out in 14 Lap—35 Miles.																							
18	Schacht	Jenkins	23	Out in 13 Lap—32.5 Miles.																							
8	Stutz	Herr	Out in 7 Lap—17.5 Miles.																								
33	Case	W. Endicott	Out 1 Lap—2.5 Miles.																								

The members of the I. A. E. marveled at the production facilities of the Ford Motor Co., Detroit, Mich. The

S. A. E. and I. A. E. Off on Lake Trip

Distinguished Visitors Royally Entertained at Indianapolis Race—Inspect Hoosier Capital's Automobile and Accessory Plants and Wonder at Magnitude of the Industry in Detroit

NEW YORK CITY, May 28—The British visitors, members of the Institution of Automobile Engineers, who arrived 2 days ago to be the guests of the S. A. E., left here at 9 a. m. today on a special train for Pittsburgh, after having been given a local reception by the members of the Metropolitan section.

After the first handshakes had been exchanged on Monday, when the guests arrived and were welcomed with an American beefsteak dinner, Tuesday was utilized to show them the greatness and splendor of New York. The Britishers were taken about the town in automobiles and during the morning they received a fair idea of what Gotham is and how it looks. This was followed by a luncheon tendered by the Automobile Club of America in its headquarters at Fifty-fourth street. In the evening, the monthly meeting of the S. A. E. was held in the ballroom of the McAlpin Hotel.

There, the subject of engine starters was taken up in an exhaustive manner. This subject had been chosen, because it was truly representative of American inventive and manufacturing spirit. R. B. Whitman read a paper on the starter situation and the influence of starters on design. After this representatives of starter manufacturers read papers illustrated by screen pictures and intended to be limited to 10 minutes each. Following were the starters described: Prof. W. C. Marshall's, Prest-O-Lite, Warner Gear Co.'s, Gray & Davis, Hartford, North East, Disco, Rushmore, Westinghouse, Ward Leonard, Bailey, U. S. Lighting & Heating companies and Entz.

H. Marmon, president S. A. E.

PITTSBURGH, PA., May 29—The visiting English engineers enjoyed a stay of one day here and then boarded their train en route for the races at Indianapolis tomorrow. During the forenoon a visit was made to the Carnegie steel works, while the afternoon was spent in a trip down the Monongahela and Allegheny rivers.

INDIANAPOLIS, IND., May 31—True Hoosier hospitality was shown the English engineers by the Indiana division of the S. A. E. during the 2 days spent in Indianapolis. The visitors

above shows the members of the English engineering society and the American S. A. E. grouped before the Ford plant

did not have an idle moment from the time they reached the city yesterday morning until they left at 9 o'clock tonight for Detroit. The 500-mile race at the speedway, of course, was the *pièce de résistance* of the visit, but the hospitality did not end there. That used up yesterday, while today was devoted to visits to the Wheeler and Schebler and Prest-O-Lite plants and a ride through the country adjacent to Indianapolis with a so-called luncheon at the Indianapolis Canoe Club, which in reality was a noon-day banquet, finishing with a visit to Broad Ripple where the visitors were treated to an old-fashioned clambake, which kept them busy until time to catch the train to Detroit.

The visitors were late in reaching the speedway yesterday, but as they marched into the paddock and took their seats in the special stand provided for them, which was located just north of the pits, they created quite a sensation. The hospitality of the speedway management was extended to them in the shape of refreshments and the men from across the big pond spent the rest of the day pulling for the Sunbeam and expressing their admiration of the big track and the system that prevailed in handling the race.

"It's a magnificent track and we from England are much surprised at your enterprise," said one of the visitors, H. Massac Buist. There's a vast difference, though, between it and Brooklands. At our speedway you cannot get the view of the race you can here. With us it is more in the nature of a road race, with the cars disappearing from view, while here one can watch them all the way around. I must say that I like this the better. Brooklands is faster—there is no doubt about that, but that's because of our high banking, where the cars can run to their limit. Here a car that has a powerful motor has the best chance because of its accelerative powers. On these turns, where you have to shut down, it is necessary to be able to make a quick pickup of the speed after coming out of the turn."

The admiration of the English for the 500-mile race was followed by the suggestion that possibly a similar race could be organized at Brooklands, although the Britons confessed that it would be impossible to get anything like the attendance Indianapolis had. It was suggested that possibly an international team race could be organized, with five cars representing each country. Some of the visitors promised to take up the matter upon their return.

T. B. Browne, president I. A. E.

It was 10 o'clock this morning when the Englishmen started on the last lap of their Indianapolis visit. Climbing into cars at the Claypool which were driven mostly by engineers from the Indianapolis factories, the first visit made was to the Wheeler & Schebler plant, where the process of carbureter manufacture proved an interesting study. Each of the party was presented with a rose by President Frank H. Wheeler, while every department of the big plant was thrown open for inspection.

Following this the visitors were whirled to the Prest-O-Lite plant at Speedway, the new horseless town. This plant, just opened, kept everyone going for more than an hour. The Britons, who rely mostly on acetylene lighting by generators, marveled at the utility and simplicity of the Prest-O-Lite tank system, and absorbed every word of information given out by the company's employes. A demonstration of the new starter was made, which also enthused the visitors, who know comparatively little of self-starters.

Next a jump was made to the Indianapolis Canoe Club, also just opened, where the visitors had a chance to see what country club life was like. It was an oppressively hot day and the cool porches were most inviting. The luncheon tables were spread on one of the porches overlooking the river and a most elaborate meal was served, which was followed by several speeches. Howard Marmon, president of the Society of Automobile Engineers, presided as toastmaster and called on H. O. Smith, president of the Premier company, for the first remarks. In a most graceful speech which breathed the hospitality of America and the admiration of the Americans,

Henry Souther congratulating Basil H. Joy on George Houk's gift

for the English engineer, Mr. Smith extended a cordial welcome to the Middle West. Replying, President T. B. Browne of the I. A. E. spoke wittily, while C. A. Bookwalter, former mayor of Indianapolis, made the address of welcome on the part of the municipality, showing a familiarity with the motor industry that impressed his hearers.

Leaving the club at 4 o'clock the engineers next were treated to a 10-mile drive through the country adjacent to Indianapolis to Broad Ripple, the scene of the clambake. It was a novel experience, that clambake, and although the party had just got up from the table, still everyone was able to make inroads into the repast, which consisted of chicken, lobster, fish and clams.

Prominent in the entertining were several of the Indianapolis engineers—Wall of the National, Weidley of the Premier, Crawford of the Cole, Howard Marmon and George T. Briggs, of Wheeler and Schebler.

Busy Time in Detroit

DETROIT, MICH., June 2—The party of twenty-five English engineers, which has been augmented to the number of about 150 by the arrival of representatives of American concerns from all over the country, have been putting in a busy time since their arrival in this city.

Yesterday being Sunday was spent by the party in gaining a slight rest from their tiresome travel and rather arduous program. Motoring trips to various parts of the city were taken and an opportunity for general relaxation was given. Today a start was made at 9.30 a. m., for the Ford plant.

The party of 115 engineers and ladies spent the forenoon at the Ford plant getting an idea of what it means to manufacture 1,000 cars per day. The activity of the plant, the organization of the various departments and the methods of manufacture and assembly astounded and bewildered the Englishmen, many of whom were unable to comment on the production methods, other than giving vent to their amazement at the speed of production.

J. B. Dunlop, of tire fame, and T. Clarkson

Henry Ford personally piloted the party through the factory, having as his right-hand guest President Browne of the Institution of Automobile Engineers, and on his left J. B. Dunlop of Dublin, the inventor of the pneumatic tire. The procession first went to the final inspection department in the back yard of the plant where each chassis is given its road test amounting to scarcely 100 yards of driving necessary in order to get in line and pass between two inspectors who glance over the chassis, examine the production papers with it and pass it along to take its body. Today the chassis were passing one in every 20 seconds, or three a minute and 180 per hour. At this rate an 8-hour day should register 1440 chassis.

The method of shipping Ford cars in knock-down condition in the freight cars was next seen. The chassis occupy one end of the car, the bodies and all other parts the opposite end. The wheels are taken off the chassis and they are placed at an angle of 45 degrees across the car. This permits of the closest packing possible.

George W. Houk and H. M. Swetland are interested

The production sheet for today showed that by 8 this morning 100 cars had passed through; by 9 o'clock 200 had been manufactured; at 10 the records showed 317, and an hour later 437 had been checked through. The daily output ranges between 925 and 950 at present. A short time ago a record was made, 1,117 cars being turned out in a single day.

The English and American engineers alike were interested in the multiple methods of production which have characterized Ford manufacture since the inception of the present four-cylinder model. Interest at one minute centered in a multiple-drilling machine which makes forty-five holes at the same time. These holes are drilled in the cylinder casting. The drills work from four sides—namely, top, bottom, right and left. By stop-watch it took exactly 2 minutes from the time the workman picked the casting from the pile back of him until he put it into the jig, drilled the holes, took the casting out and laid it down on the pile at the other side of him. A few feet away other machines were behaving with equal human intelligence. The stop watch showed exactly 1 minute necessary to put castings into the drills, have the holes drilled and return the casting to its place.

What interested Basil H. Joy, secretary of the I. A. E., most was the method of piston manufacture, it being accomplished in

about the same fashion that a lead pencil is sharpened by an automatic machine sharpener. The piston in the rough is mounted on a vertical spindle. Immediately it starts to revolve two cutters begin operations, one cutting the sides and the other the piston head, both being so timed that the operations are completed at practically the same second. Immediately they are done four other cutters begin, three cutting the grooves for the piston rings and the fourth the broad recess opposite the end of the wristpin. The beveled edge of the piston head is accomplished by another cutter. While the stop watch was not held on the operation, it was but a slight pause in the procession to watch the entire job.

The fact that Henry Ford employs workmen by the day and week and has no one at piece work astonished all of the visitors. They imagined that piece work was the only possible method to be employed in a factory employing 16,000 workmen. Their excursion through the plant soon convinced them that Ford accomplishes results in other ways, in a word, that he is a general of men and so arranges much of the work that the pieces undergoing work pass in procession through the hands of perhaps six or a dozen workmen so that if any one workman slackened the regular pace he would hold all of the others in the series back, the work would pile up around him, and the only conclusion would be that he was not competent for the job. Ford has proven that he is right, and that results can be obtained without piece work.

T. Clarkson, manufacturer of steam omnibuses for the city

Group on steps of Ford plant—Mackie (hands in pockets), Norton (arms folded), Prestwick (arms behind back)

of London, was an interested observer and student of Ford production. Mr. Clarkson was a visitor to America for the Chicago Fair 20 years ago, when motoring was scarcely in its swaddling garments.

One of the pleasantest features of the day occurred just at the completion of the Ford visit when George W. Houk, controller of the Rudge-Whitworth wire wheel interests in America, presented a full-fledged touring car to Secretary Basil H. Joy of the visiting engineers. Mr. Houk has known Mr. Joy for years, having lived 14 years abroad. Henry Souther, ex-president of the S. A. E., made the presentation speech. The presentation was a spur-of-the-moment affair, Mr. Houk purchasing the car a few minutes before it was presented, and the car itself having been manufactured while the visitors were passing through the factory.

The entire afternoon was spent by the party in making the rounds of the factory of the Cadillac Motor Car Co. Here

Two of the visitors—C. H. Wheeler and R. H. Smith

the visiting engineers were given an opportunity of seeing the American methods of manufacture which had been worked out in a plant which is working on an annual schedule of 15,000 cars.

The last 1913 car is scheduled to leave the factory of the Cadillac company at 5 p. m. of June 14. On that day the last of that model will have passed through the assembling plant and the entire manufacturing attention will be given over to the 1914 product. For the coming season 18,000 cars are scheduled, and material and accessories for that number of cars has been ordered.

Welcome from the Cadillac

On the arrival of the party at the Cadillac plant after luncheon at Ardussi's, the members were led to a reception room which but a few hours before had been a part of a busy machine shop. Seats were arranged in rows and the party seated themselves and listened to an address of welcome by H. M. Leland, president of the Cadillac company. Mr. Leland explained the manner in which the party was to be conducted through the various departments and assigned each group to a separate guide.

Following one of the parties through the works many expressions of interest were head from the English visitors. The elaborate system of gauging every piece of work by under and over-limit gauges provoked general comment. The large machines designed for special work were also greatly admired.

One of the representative parties going through the works started at one of the shops where some large milling operations were being carried out. In this department there was a large Ingersoll milling machine which faced off sixteen of

D. Beecroft, Ker of Scotland, and A. L. McMurtry

Mr. Souther's presentation of the Ford car was amusing

the engine supporting arm faces at a time, eight on each side. This machine takes the place of four machines which formerly carried on this work.

Passing to the block testing room in which each of the engines are tested before they are mounted in the chassis, the full set of seventy-five engines were seen running on separate blocks. Each of the motors is given a thorough running test here under a moderate load of about 10 horsepower. The racks upon which the motors are carried are of special design and attracted the interest of the entire party. Mr. T. B. Browne, president of the Institute of Automobile Engineers, was particularly interested in the explanation of the guide of these racks. It is possible to turn the motor upside down in less than a minute and to adjust the bearings by simply removing the bottom of the crankcase which arrangement seemed very ingenious to the visitors.

In the bearing department a special feature of interest is the method used in placing the babbitt in the brass bearing caps. The babbitt metal has no affinity for brass. Solder, however, has an affinity for both brass and babbitt, so that babbitt liners are put on after the brass bearings have been tinned. The solder forms a binding strip between the babbitts and the brass.

New Machines Interest Visitors

The manufacture of the smaller parts brought in some machinery which was new to the English guests as well as to many of the American visitors. In making the shackle bolts for the springs a revolving fixture is used which feeds to the cutters 3,500 bolts per day. A shackle bolt passes through the machine every 45 seconds.

The assembling work throughout the plant was examined with the greatest care. In the motor assembly department the crankshafts were set up and run by belt in their own bearings and then taken down and the bearings scraped by hand. The Cadillac car uses five main bearings which amount to a total of 95.75 square inches of bearing surface. All of this surface is gone over by hand, not a shim being used in the motor.

In assembling the connecting-rods the lower bearing cap screws are very carefully made. This is an exceptional piece of work as the screws are first done in the rough to within .001-inch limit and are then sent through a special burnishing tool through which they must come within .0005 inch. The lower end of the connecting-rod itself its ground to .001 inch and the exterior of the bearing bushing is ground within the same limit. This gives two ground surfaces against each other in this bearing.

Before visiting the testing room of the plant in which all the chassis receive their work-out instead of on the road, the party was conducted to the room in which they were originally assembled and there found a series of tables at which tea and bread and butter were served. At the close of this repast H. M. Leland presented each of the English visitors with a gold Cadillac fob.

The two presidents, T. B. Browne and Howard Marmon

The testing room proved of great interest. Twenty-two Sprague dynamometers were arranged along the longitudinal walls of the room. In each of these a chassis was passing through what corresponds to the road test.

The chassis is backed into place and a hydraulic jack lifts the rear wheels from the ground. In 10 minutes the wheels are connected by chains to the dynamometer and the entire driving mechanism is put through a 3.5-hour test. During this time the car is run an hour at a speed of 30 miles an hour and 10 minutes on the lower speeds and reverse. Various speeds are tried and any noises which develop are carefully noted by the attendant who is in charge of two testing stands. The road test is entirely eliminated and a great saving results.

Detroit Banquet Well Attended

DETROIT, MICH., June 3—*Special Telegram*—The most successful banquet in the history of the S. A. E. was held tonight at the Pontchartrain. Seated at the tables were men of the greatest prominence in the industry both of this country and England. Howard Coffin acted as toastmaster.

Howard Marmon, president of the Society of Automobile Engineers, made a short address on the welcome accorded to

Henry Souther and George W. Houk, donor of the Ford car

The two secretaries, Coker Clarkson and Basil Joy

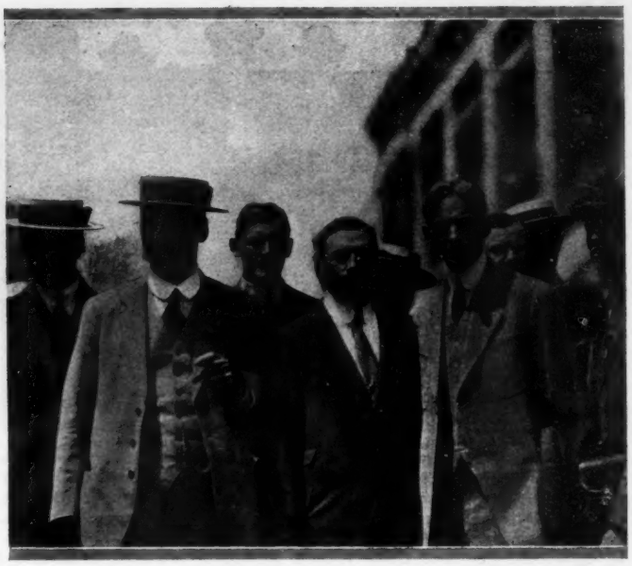
the visiting engineers of both countries by the city of Detroit. He thanked the city of Detroit for the freedom of the city and for the symbol given to the engineers of both bodies in the form of the engraved parchment granting the courtesies of the greatest city of the industry. T. B. Browne, president of the I. A. E., was introduced as one of the pioneers of the industry in Great Britain. In 1900 he was an active participant in the 1,000-mile test run given the old single-cylinder horizontal engine of that day. His speech was one of thanks for the hospitable welcome given the English visitors.

Browne on American Hospitality

Mr. Browne said: "You are the most hospitable nation in the world. I am impressed by the organization of the industry in your country, particularly as it is in Detroit. A perfect Niagara of cars streams forth from the factories here. We are also impressed by the beautiful city. Detroit reminds us of Paris more than any other city we have been in. You have made enormous strides in the past 20 years and in a short time you will have nothing but automobiles here.

"Fuel, of course, is a serious consideration with you, as with us. It now costs 1 shilling 9 pence a gallon, but we may soon use kerosene, especially for the commercial vehicles, and we have hopes of being able soon to use a coal product. We admire the care used in the work here and we hope to emulate the standardization which you have worked out so well here but

Swetland, Prestwick and Houk reading the latest



Group of engineers, T. B. Browne and Henry Ford in the center

which is apt to be much slower of establishment in England.

"We feel at home here, not as if we were in a foreign land, and your jokes appeal to us in spite of the story that an Englishman cannot see a joke."

Mr. Browne concluded with some appropriate words of thanks for the freedom of the city extended by the Mayor and for the parchment proclaiming the same which was presented to the I. A. E.

T. C. Pullinger, one of the English engineers, in speaking on the subject of production in a motor car factory said: "You must know your business before you can be a success in it. What is needed most in a factory is men who will operate the machines as you want them to be operated. It is not a bit of good taking a lot of engineers to work machines in your factory because it is the most difficult thing to teach them how to operate them as they should be operated. They all think they know more than the factory manager. In Scotland I looked around for soldiers and sailors who were ready to go to work and I found them willing to learn what you want to teach them. At the present time these men are doing better work in their several operations than many of the educated men we have.

Reduce Dead Charges

"To make a motor car factory successful you must first of all get away from dead charges or what is known as non-productive labor as much as possible. Inspection departments are good but it is better policy to teach your men to do accurate work. If you get your men to make the parts accurately you have accomplished one of the biggest things in the automobile shop. Try in this way to reduce your dead charges and you will reach eventual success."

H. M. Leland, president of the Cadillac Motor Car Co., gave what he characterized as a little shop talk. This was really a look into the future and it showed how the ideal car will have to be made under a combination of ideal production methods by which all factors entering into the making of such a vehicle will be of the most efficient character. Mr. Leland dealt with the ideal automobile plant, that which might be and will be in operation at some distant time; he said the success of such a plant depends upon a combination of ideal conditions. He explained how this ideal car, which he said had not yet been produced, could be a success and be manufactured so that its factory could pay dividends. It is made possible by just two words—knowing how. Just as it is necessary to know how to breathe before one

(*Continued on page* 1180)

Automobile body manufacturers in attendance at the Haynes Automobile factory, Kokomo, Ind., May 24, 1913. Standing, from left to right: J. J. Parkhurst, Laporte Carriage Co., Laporte, Ind.; Ward Halladay, Central Mfg. Co., Connersville, Ind.; A. Noble, Racine Mfg. Co., Racine, Wis.; H. W. Paton, Detroit Body Works, Detroit, Mich.; J. A. Eberhart, Portland Body Works, Portland, Ind.; C. O. Mainor, Carriage-Woodstock Co., Owensboro, Ky.; Ernest Wood, Laporte Carriage Co., Laporte, Ind.; W. A. Lyons, Capitol Body Co., Indianapolis, Ind.; W. B. Ansted, Central Mfg. Co., Connersville, Ind.; A. L. McCullough, Carriage-Woodstock Co., Owensboro, Ky.; L. C. Smith, Portland Body Works, Portland, Ind.; R. Crawford, Advertising and Publicity Manager, Haynes Auto Co., Kokomo, Ind. Sitting, from left to right: C. C. Adelsperger, Union City Body Co., Union City, Ind.; C. S. Davis, Glascock Bros. Mfg. Co., Muncie, Ind.; C. M. Lejuste, Purchasing Agent, Haynes Automobile Co., Kokomo, Ind.; Frank N. Nutt, Chief Engineer, Haynes Automobile Co.; A. G. Seiberling, General Manager, Haynes Automobile Co.; J. S. Power, Draughtsman, Haynes Automobile Co.; W. T. Helfer, Racine Mfg. Co., Racine, Wis.; D. L. Watson, Manager Order & Service Dept., Haynes Automobile Co.; L. E. McKenzie, Assistant Sales Manager, Haynes Automobile Co.; A. H. Wilhelm, Superintendent, and A. E. Starbuck, Treasurer and Director of the Haynes Automobile Co.

French Car Workmen Clamor for 5.5-Day Week

Majority of Plants Crippled—All Italian Works Are Closed—Altogether 8,000 Men Are Affected

PARIS, May 24—Trouble has again broken out among the workers in the French automobile factories with regard to what is known as the English week. For some time past there has been a strong movement towards the closing of the factories on Saturday at noon, as is done throughout practically the whole of England. This has been done in a few of the factories, among them being Delaunay-Belleville, Hotchkiss, Gnome Aviation Motor Works and the Goodrich tire factory. The present discontent began with the bodymakers, such leading firms as Belvalette, Labourdet, Rothschild, etc., being affected. It spread to the bodyworking department of Bayard-Clement, and from there has spread to the engineering section. A large number of the workmen at the Bayard-Clement factory are now on strike. The Delage factory was affected to a slight extent, but after an explanation by the owner the question was submitted to a private vote and a small majority decided against a strike. In view of possible disorders at the Bayard-Clement factory gendarmes and soldiers have been called out.

Practically all the Italian factories have been closed for the last 60 days, the workmen asking for an increase in wages which the manufacturers refuse to grant. Altogether 8,000 workmen are affected, the shops closed by reason of the strike being Itala, Fiat, Isotta-Fraschini, Bianchi, Aquila, Storero and Spa.

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Connecticut's Wood for Automobile Use

HARTFORD, CONN.—The manufacture of automobile bodies is conspicuous among the wood using industries of Connecticut. Automobile body construction demands ash in greater quantities than any other kind of wood, and its immense production of this wood places Connecticut in a leading position. Out of the total quantity of ash used annually in the construction of vehicle and vehicle parts over one-quarter, or 26 per cent., is grown in Connecticut. The exceptional strength of this wood combined with its light weight renders it a favorite for body framework. Yellow poplar, or white-wood, is the other important body wood and meets an exacting demand for panel work. Because of its fine grain and the fact that it is soft and easily worked, besides having a special capacity for holding paint, it is the favorite wood with builders of high-class automobiles and other vehicles. Another wood worthy of mention is cypress, although it is not used as yet in any very great quantities. This wood, however, is growing in favor as a panel wood for fine vehicle bodies.

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NEW YORK CITY, June 4—Fred J. Wagner has been made vice-president of the Ajax-Grieb Rubber Co. He will superintend the company's tire sales.

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State Registration Running High

COLUMBUS, O., June 2—During the first 4 months of 1913, more than 67,000 automobile licenses have been issued in this state, as compared with a total of 63,117 for the entire year 1912. Up-to-date receipts of $278,729 exceed those of last year by $3,000.

SAVANNAH, GA., June 1—The first 4 months of this year show a state registration of 20,078 cars as against 14,000 for the same period last year. The other southern states have also made considerable progress, the comparative figures being as follows: Tennessee, 1913, 11,225 and 1912, 7,181; Florida, 9,978, 4,896; Alabama, 4,350, 3,360; North Carolina, 7,000, 4,000; Arkansas, 4,500, 3,360; Virginia, 7,000, 4,000; Mississippi, 3,079, 2,000; Kentucky, 7,500, 4,000.

AUSTIN, TEX., May 31—There are at present 10,026 automobiles in San Antonio, Dallas, Houston and Fort Worth, which four cities have an aggregate population of 340,830, the population per automobile being 36, 31, 28 and 45 respectively.

MADISON, WIS., May 31—Alexander J. Cobban, in charge of motor registry in the secretary of state's department of Wisconsin, predicts that the Wisconsin pleasure car registration for 1913 will reach 30,000. On May 12 the registry passed the 25,000 mark, and on May 21 license No. 26,442 was issued, meaning that on May 21, 1913, the registry was nearly 900 in excess of the total registry for the entire year of 1912.

Peugeot and Benz Break Climb Record

PARIS, FRANCE, May 26—Originally held by the local champion Deydier, on a Cottin-Desgouttes car, the record for the Limonest hill climb was this year broken twice. First Georges Boillot, on the Peugeot, 1912 Grand Prix model, similar to the two taking part in the Indianapolis race, lowered the record from 2.24 to 2.07. A few minutes later Fritz Erle on a 200-horsepower Benz clipped the time to 2 minutes 2.5 seconds. As the hill has a length of 2.32 miles, the average speed is at the rate of 68.26 miles an hour. The gradient varies from 2 to 7.5 per cent., and the hill is marked by two very difficult turns, almost impossible to take at full speed. The victorious Benz is a special four-cylinder racing model with which Erle broke the Gaillon hill-climbing record last year at an average speed of 101.5 miles an hour. The car has a bore and stroke of 7.1 by 7.8 inches, and is chain-driven. Boillot's Peugeot, which came second, is a smaller car, measuring 4.3 by 7.8 inches bore and stroke. Third place was secured by Champoiseau on a Th. Schneider car intended to be run in this year's French Grand Prix at Amiens.

The fastest time in the touring car section was made by a six-cylinder Gobron-Brillie driven by Pons in 3 minutes 4.4 seconds. Second place went to Descours on a Turcat-Mery touring car, defeating a six-cylinder Peugeot entered in the higher class. The Peugeot, however, had the disadvantage of running with a wind-resisting closed body. René Thomas, who is scheduled to drive one of the Schneiders in the French Grand Prix, made a good showing with one of the 3-liter models on a touring chassis in 3.32.6 seconds. Juvanon, also on a Th. Schneider, won his class with one of the sleeve valve models in 3:54.5.

Results, Racing Cars

No.	Car	Bore and Stroke, Inches	Driver	Time
1	Benz	7.1 by 7.8	Fritz Earle	2.02.5
2	Peugeot	4.3 by 7.8	Georges Boillot	2.07.3
3	Th. Schneider	3.7 by 7.4	Champoiseau	2.36.8
4	Bugatti	2.5 by 3.9	Friedrich	3.12.8
5	De La Chapelle	3.1 by 6.2	Riviere	3.13.2
6	Vermorel	2.9 by 4.7	Dupont	3.13.9
7	Benz	2.8 by 4.7	Bourdon	3.47.9
8	Clement	2.9 by 4.7	Servoz	3.51.3
9	Mors (Knight)	2.9 by 4.7	Felix Dubois	4.43.3
10	Ronteux	2.4 by 3.1	Jolibois	5.07.7

Touring Cars

1	Gobron-Briellie 6-cyl	4.3 by 7.8	Pons	3.04.4
2	Turcat-Mery	4.3 by 6.2	Descours	3.19.7
3	Th. Schneider	3.2 by 5.5	Rene Thomas	3.32.6
4	D. F. P.	2.7 by 5.1	Lacharnay	3.40.6
5	Diederichs	2.7 by 5.5	Laurent	3.49.6
6	Bugatti	2.5 by 3.9	Luc Germain	3.53.8
7	Th. Schneider	3.1 by 5.5	Juvanon	3.54.5
8	Alcyon	2.9 by 4.7	Giroux	3.58.3
9	Vermorel	2.9 by 4.7	Gerard	3.58.7
10	Benz	2.8 by 4.7	Spamann	4.28.4
11	Peugeot 6-cyl.	4.7 by 5.1	Reith	4.38.9
12	Baby Peugeot	2.1 by 3.5	Pichenot	5.09.6
13	Baby Peugeot	2.1 by 3.5	Aime	5.58.8
14	La Sauterelle 1-cyl.	3.9 by 4.7	Tamisier	9.28.5

Ninety-Eight Trucks Entered in French Trials

PARIS, FRANCE, May 26.—Instead of a series of trips around Versailles, the ninety-eight commercial vehicles entered for this year's French trials will be sent on a journey across France with Lyons and Bordeaux as the extreme points. This competition, which is almost exclusively a military event, is organized with a view to testing the endurance of the trucks and their suitability for participation in the military subsidies. If a vehicle accomplishes the tests in a successful manner the manufacturer has the advantage of selling all duplicates of this model as army subsidized types, the purchaser receiving an annual subsidy and entering into an agreement to hand over the truck to the military authorities in case of mobilization.

This year's trials will last from July 1 to August 12. The first 3 days will be occupied in weighing and sealing the vehicles at Versailles. From July 5 to 12 a series of runs will be made from Versailles, the daily distance being from 60 to 90 miles, the fuel being gasoline. On July 16, 17, 18, 19, and 20 town to town runs will be made under full load with carbureted alcohol used as fuel. After a rest at Dijon the competing machines will continue to Lyons, Montbrison, Clermont-Ferrand, Limoges, Perigueux, and Bordeaux, carrying full load and using benzol. A day's rest will be allowed at Bordeaux, the return to Versailles being made in five stages, through Angouléme, Poitiers, Tours and Chateaudun, using gasoline as fuel. August 8 and 9 will be rest days, and the 3 following days will be occupied in dismounting the various organs of the machines in order to judge the amount of wear that has taken place. The firms entered in the trials are the following: Delahaye, Panhard-Levassor, Balachowsky & Caire, De Dion Bouton, Rochet-Schneider, Berliet, Motobloc, Delaugere & Clayette, Latil Saurer, Brasier, La Buire, Peugeot, Clement-Bayard, Lorraine-Dietrich, Aries, Cohendet and Cottin & Desgouttes.

RACINE, WIS., June 2.—Of the 120 Racine manufacturing concerns that will exhibit in the first annual Made-In-Racine exposition, to be held in the new J. I. Case foundry at Lakeside, Racine, from June 9 to 14, under the auspices of the Racine Commercial Club, nearly fifty are manufacturers of and will exhibit motor cars, parts, accessories, bodies, etc.

FINDLAY, O., May 26.—Beecher W. Waltermire has been appointed trustee in bankruptcy of the Findlay Motor Co., recently sold to L. E. Ewing, its promoter, for $50,000. The debts will aggregate $158,000, while claims to the amount of $121,000 have been allowed.

Two Killed in Grand Prix Practice

PARIS, May 23.—While training for the French Grand Prix, Guido Bigio, chief engineer of the Itala Co., and his mechanician, Giovanni Abrizzon, were killed in the neighborhood of Dieppe yesterday morning. Bigio, who had been connected with the Itala factory at Turin for about 7 years and was somewhat recently appointed technical director, was tuning up the cars specially built for the French Grand Prix race next July.

PARIS, FRANCE, May 27.—An examination of all the circumstances under which the Italian engineer, Guido Bigio, and his mechanician met their deaths while practicing near Dieppe for the French Grand Prix point to the fact that the Itala race driver attempted what appeared to be a fairly easy turn at too high a rate of speed. The road on this portion of the old course comprises some magnificent straightaways, a short portion of a switchback nature and a very fine down grade into Eu. One of the short rises was followed by a fairly easy bend. It is supposed that the Itala engineer came up to this rise at a very high speed to discover that he had to make a turn. His rate of speed was too high to get round correctly, the car skidded violently, grazed a tree, taking the bark off for a height of 10 feet, and turned over, coming to a stop in the ditch with the four wheels in the air.

Milwaukee's Inter-Club Run

MILWAUKEE, WIS., June 2.—Saturday, June 28, has been selected as the date for the first annual Milwaukee Inter-Club, a team match trophy tour between the Milwaukee Athletic Club and the Milwaukee Automobile Club. The run will be modeled along the lines of the annual competition between the Chicago Automobile Club and the Chicago Athletic Association.

WASHINGTON, D. C., June 2.—The Washington Automobile Racing Association has been formed to conduct a series of race meets on Benning track. The first event is scheduled for June 21.

View of the Turcat-Mery touring car, which was second among cars of this class in the Limonest hill-climb, at the beginning of the upward gradient

Wreck of the rotary valve Itala, in which Guido Bigio, chief engineer of the Itala company, and his mechanician were killed near Dieppe, France, while practising for the Grand Prix

Case and Pierce Defeat Stephenson Truck

Weed Is Granted an Injunction Against Makers of the Federal Grip—Cole Capital Raised to $1,000,000

Knight Motor Finds Truck Field in Europe—Benz Importers Lose Froelich Suit

MILWAUKEE, WIS., June 2—Judge W. J. Turner of the Circuit Court of Milwaukee county found in favor of the defendants in a decision handed down in the suit of the Stephenson Motor Truck Co. of South Milwaukee vs. the J. I. Case Threshing Machine Co. and Pierce Motor Co., of Racine, for $100,000 damages on the claim of breach of contract. The finding of Judge Turner in favor of the Case and Pierce concerns is virtually a dismissal of the suit. The costs are taxed against the plaintiff.

The Stephenson Motor Truck Co., of Milwaukee, with works at South Milwaukee, entered into an agreement with the J. I. Case Threshing Machine Company, of Racine, which had at that time effected an affiliation with the Pierce Motor Co., and since absorbed this concern, to purchase its entire output of delivery cars for a certain period, at the end of which the Stephenson company was to be purchased by the Case company under certain conditions. By this means the Case company virtually became a factor in the motor delivery car field, having previously entered the pleasure car field as marketer of the output of the Pierce Motor Co.

However, the Stephenson product did not come up to the expectations of the Case company, and when the time came for the consummation of the agreement, the Racine concern refused to proceed, claiming that the Stephenson company's product was not up to specifications. Upon the Case company's refusal to purchase the Stephenson company, the latter brought suit to enforce the agreement, and asked for $100,000 damages due to the loss of business and inability to market its own product because of the arrangement with the Case company.

Since the beginning of the suit the Stephenson company has been marketing its own product and intends to continue to do so. The Case company has not made further efforts to engage in the delivery car field and confines its motor car business to the manufacture of Case passenger cars.

Federal Chain Injunction Issued

NEW YORK CITY, June 3—The Federal Chain & Mfg. Co., as well as James Millard & Son Co., William F. Holroyd, Maurice H. Cormack and Frederick Cormack were enjoined from manufacturing chain tire grips which were claimed by the Parson Non-Skid Co., Ltd., and the Weed Chain Tire Grip Co. to be infringements of the Weed patents. The preliminary injunction was issued by Judge Lacombe in the U. S. District Court, Southern District of New York, on the strength of the fact that the grips resemble closely the products which brought about the injunction against the makers of Atlas chains.

Cole Doubles Capital to $1,000,000

INDIANAPOLIS, IND., June 2—Application has been made to the Indiana secretary of state for authority to increase the capital stock of the Cole Motor Car Company, Indianapolis, from $500,000 to $1,000,000. The company has adopted plans for increasing its manufacturing facilities to a large extent.

Motor Wagon Co. Adjudicated Bankrupt

DETROIT, MICH., May 24—The Motor Wagon Co. of this city was adjudicated bankrupt on May 12. A meeting of the creditors will be held here in June to arrange matters.

NEW ORLEANS, LA., May 27—Freight rates on practically all of the European lines to South America were raised May 1. The increase in many cases amounts to 20 per cent. This will be a decided advantage to the American manufacturer of motor cars.

Knight Motor Used on Trucks

LONDON, ENGLAND, May 24—The Knight sleeve valve motor is being used considerably in the commercial field in Europe. The Daimler company, of Coventry, has to date 250 buses and trucks with Knight motors in commission and is at present building 450 buses for the London service, these being equipped with four-cylinder motors 4.33 by 5.91 inches bore and stroke. The chassis of these buses are so designed that they may be used for truck purposes. Forty of these buses have now run an average of 20,000 miles each on the London streets carrying their average load of 40 persons. They are built with a gear ratio of 7 to 1 and are frequently called upon to do 25 miles an hour which means 1,600 revolutions per minute of the motor.

There are several of the Knight type trucks in use throughout England and on the Continent. One bus operating in Constantinople takes in in fares $40.00 per day, seven are running in Munich, Germany, and others in different cities. Recently a sample bus has been placed in the service of the Fifth Avenue Coach Co., New York City.

Froelich Wins Against Benz

NEW YORK CITY, June 4.—The Benz Auto Import Co.'s two suits against Jesse Froelich, its former manager, were dismissed with cost yesterday, when they came up in the Supreme Court of New York before Justice Erlanger. The first suit was for $7,500 in payment of two Benz cars, and the second for $22,500 in payment of 225 shares of stock of the American company. J. S. Epstein, attorney for the defendant, showed to the satisfaction of the court, that Mr. Froelich, in the matter of the first suit, had sold to the home Benz company at Mannheim, Germany, $15,000 of stock formerly his property, half of which was paid for in cash by the German company and half in the form of two Benz cars delivered by the New York concern, who charged the Mannheim company with it, against a credit of the latter with the New York company. This was shown by the books of the Benz company. As for the 225 shares of stock of the New York company, these were transferred to the German company by its American legal representative, Walter Mass, as the stock books of the New York concern showed. On the strength of this proof, the jury dismissed the suits, with payments to be borne by the Benz Auto Import Co.

Automobile Securities Quotations

STOCKS this week varied but little from the prices of last week, due to few developments. Trading was limited.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	110	120	155	..
Ajax-Grieb Rubber Co., pfd	90	100	95	100
Aluminum Castings, pfd	100	102	98	100
American Locomotive Co., com	40¾	41	31	32
American Locomotive Co., pfd	107	108	102	103
Chalmers Motor Company, com	..	..	128	138
Chalmers Motor Company, pfd	..	..	98	102
Consolidated Rubber Tire Co., com	16½	18½	14	18
Consolidated Rubber Tire Co., pfd	55	59	60	75
Firestone Tire & Rubber Co., com	268	272	259	263
Firestone Tire &Rubber Co., pfd	106½	107½	105	107
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	100
Garford Company, preferred	99½	100½	..	97½
General Motors Company, com	34	35	26	30
General Motors Company, pfd	73	75	73	74¾
B. F. Goodrich Company, com	82½	83¼	29⅞	32
B. F. Goodrich Company, pfd	108¼	108¾	91	94
Goodyear Tire & Rubber Co., com	270	273	312	317
Goodyear Tire & Rubber Co., pfd	100	105	98½	99¼
Hayes Manufacturing Co	..	103	..	90
International Motor Co., com	28	32	5	6
International Motor Co., pfd	90	94	10	15
Lozier Motor Company, com	45	55	15	20
Lozier Motor Company, pfd	..	..	..	92
Maxwell Motor Co., com	..	..	3	5
Maxwell Motor Co., 1st pfd	..	..	32	36
Maxwell Motor Co., 2nd pfd	..	..	10	15
Miller Rubber Company	160	163	138	147
Packard Motor Company	104½	106½	98	102
Peerless Motor Company, com	..	..	45	50
Peerless Motor Company, pfd	..	..	..	96
Pope Manufacturing Company, com	29	30	12	15
Pope Manufacturing Company, pfd	74½	75½	45	48
Portage Rubber Co., com	..	..	35	40
Portage Rubber Co., pfd	..	..	90	95
Reo Motor Truck Company	9	10½	11	12
Reo Motor Car Company	23	24½	20	22
Rubber Goods Mfg. Co	105	110	105	110
Studebaker Company, com	38½	40	24¼	25½
Studebaker Company, pfd	96	98	89	90¼
Swinehart Tire Company	106	107	85	88
U. S. Rubber Co., com	..	..	60	61
U. S. Rubber Co., 1st pfd	..	..	104¼	105
White Company	108	110	107	110
Willys-Overland Co., com	..	..	58	65
Willys-Overland Co., pfd	..	..	85	94

A. C. of C. Will Revise Car Warranty

Committee To Arrange Details—Evans Moves to Nashville—Luverne Has New Unit Power Plant

Ford's Machinery Moved from Buffalo to Detroit—Remy Company May Make Oil Engines

NEW YORK CITY, June 4—A revision of the standard warranty on passenger cars was proposed by the members of the Automobile Chamber of Commerce who were present at the monthly meeting of the board of directors today. These were: Charles Clifton, W. E. Metzger, W. T. White, W. C. Leland, G. W. Bennett, L. H. Kittredge, F. T. Davis, Jr., J. N. Gunn, H. H. Rice, C. C. Hanch and A. L. Pope.

Mr. Metzger resigned as representative of the Maxwell Motor Co., Inc., but was re-elected to the board as representative of the Argo Electric Co., Saginaw, Mich.

The committee for warranty revision is composed of Messrs. Hanch, Rice and White. The show committee of the body was given the task of working out details for the coming Chicago and New York shows. A request was received from the A. A. A. to co-operate with it in the fight against truck legislation now pending in New Jersey and this matter was referred to the legislative committee.

The next meeting will be held at Christmas Cove, Me., on July 18.

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LOUISVILLE, KY., June 2—The Ten Broeck Tire Co., capitalized at $250,000, announces the opening of its plant on June 10 for the manufacture of pneumatic and solid tires in all standard types, both plain and non-skid. The tire is named for Kentucky's famous race horse Ten Broeck. The factory is located at Twenty-sixth and Courtney streets. There are 55,000 square feet of floor space under one roof. The officers of the company are H. L. Lewman, president; Fred Haupt, vice-president; W. N. Cox, treasurer, and Dr. F. L. Koontz, secretary.

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DETROIT, MICH., May 31—The Evans Motor Car Co., which has absorbed the Automobile Mfg. & Engineering Co., a former Detroit concern fathered by R. H. Evans, has definitely located its plant at Nashville, Tenn., where a complete factory for the manufacture of commercial cars and motors is to be built, according to Mr. Evans. The Evans company was organized March 20 under the laws of Tennessee with a capital of $50,000, which, however, is soon to be increased to $200,000, it is stated. The factory is to measure 60 by 200 feet and 500 trucks are to be made the first year with a force of men in the neighborhood of 500. The Evans car has a capacity of 1,500 pounds and is equipped with a 30-horsepower Continental motor and a Timken rear axle.

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Luverne Has New Unit Power Plant

LUVERNE, MINN., May 31—The Luverne Automobile Mfg. Co., of this city, have placed upon the market a four-cylinder, unit power plant which is completely equipped, consisting of motor with carbureter and high-tension magneto attached. Multiple-disk, dry-plate clutch, selective transmission, with control levers and pedals attached and connected are included in this power plant. If desired, the motor is equipped with electric generator and starter.

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Ford Buffalo Branch Moves

BUFFALO, N. Y., May 31—Employees of the Ford Motor Co. branch at Kensington avenue and Liberty street were paid off Friday afternoon and preparations at once were made to ship all machinery of the plant to Detroit, where the firm has contemplated removal for some time. The recent labor trouble and strike in the local Ford plant hastened action of the firm in removing its machinery to Detroit. About 500 men were regularly employed in this plant.

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INDIANAPOLIS, IND., June 2.—There is an unconfirmed rumor that Frank and Perry Remy of Anderson, formerly owners of the Remy Electric Co., expect to engage in the manufacture of kerosene oil engines. They have been engaged in secret experiments for several months and have been negotiating for a factory. It is reported that within a short time the Remy brothers will be ready to make public their plans for the future.

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NEW YORK CITY, June 2.—The Grimm ordinance abolishing private stands for taxicabs in New York City and the leasing of the streets in front of hotels by the proprietors of the latter and reducing the rates for taxicab service was passed last week by the Board of Aldermen's vote of 65 to 1.

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WASHINGTON, D. C., June 2.—Recognizing the great question of good roads the Democratic caucus of the House of Representatives today created a committee on roads, with Representative Dorsey Shackleford, of Missouri, as chairman.

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NEW YORK CITY, June 3.—A meeting of the creditors of the bankrupt New York Motor Works, Inc., Newark, N. J., has been ordered by the Chancery Chambers in Newark for June 24. At this meeting the creditors and stockholders are to show cause why the receiver's account now on file should not be allowed, allowance for the receiver's services made, a 66 per cent. dividend with interest paid and a final dividend paid out of the money remaining in the hands of the receiver after this payment.

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NEW YORK CITY, June 4.—The Brady-Murray Motors Corp., distributor of the Chandler six cars and the Maccarr, Lansden electric and Smith commercial vehicles, has leased the first two floors of the new eleven-story building under construction at 245 West Fifty-fifth street. The company will move into its new quarters July 1. R. J. Laciar is sales manager.

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ANDERSON, IND., June 2.—G. A. Lambert and James A. Burk have bought the interests of B. F. Lambert, president of the Buckeye Mfg. Co., Anderson, Ind., which builds Lambert motor cars. They have been interested in the company for some time. B. F. Lambert has bought a controlling interest in the Elwood Iron Works, Elwood, manufacturers of heavy castings and of an oil engine recently perfected by David Morrison, a machinist of Anderson.

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NEW YORK CITY, June 3.—The Packard Motor Car Co. has declared a quarterly dividend of 1¼ per cent. on its preferred stock.

Market Changes for the Week

TIN slumped this week to $46.55 per hundred pounds. The market was unsettled and irregular and still below the cost of importation from London. Copper was dull and heavy, the consumers here and abroad buying sparingly and the speculators showing small interest. Both electrolytic and Lake coppers dropped in prices, the former $.00 3-10 and the latter $.00 1-4 per pound. Lead was dull but steady, remaining constant at $4.35 per hundred pounds. Bessemer and Open-Hearth steel rose $1.50 and $.50 respectively. Automobile tire scrap held firm at $.10 per pound. Cottonseed oil rose $.05 per barrel, though there was decided weakness on Tuesday due to a break in lard. Petroleum prices remained firm and unchanged and the consumption was liberal. Linseed oil was quiet and unchanged. Gasoline, rapeseed oil, sulphuric acid and antimony remained unchanged.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb...	.07½	.07½	.07½	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	25.00	25.00	25.00	25.00	26.50	26.50	+1.50
Copper, Elec., lb...	15 11/20	.15⅜	.15⅜	.15½	.15¼	.15¼	— .00 3/10
Copper, Lake, lb.....	.15¾	.15¾	.15¾	.15 7/10	.15½	.15½	— .00¼
Cottonseed Oil, lb.	7.15	7.18	7.20	7.22	7.28	7.20	+ .05
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, brown.	.34	.34	.34	.34	.34	.34	.....
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs..	4.35	4.35	4.35	4.35	4.35	4.35	.....
Linseed Oil....	.48	.48	.48	.48	.48	.48	.....
Open-Hearth Steel, ton....	26.00	26.00	26.00	26.00	26.50	26.50	+ .50
Petroleum, bbl., Kansas crude	.88	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude...	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy.		4.35	....	....	4.35	4.50	+ .15
Silk, raw Japan		3.70	....	....	3.70	3.75	+ .05
Sulphuric Acid, 60 Baume...	.90	.90	.90	.90	.90	.90	.....
Tin, 106 lb....	48.00	47.70	47.65	47.13	46.65	46.55	—1.45
Tire, Scrap....	.10	.10	.10	.10	.10	.10	.....

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H. M. Swetland, President

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Chicago—910 South Michigan Avenue Detroit—505 Free Press Building

Boston—1035 Old South Building Cleveland—309 Park Building

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The Visiting English Engineers

IT is to be hoped that more visits between foreign and American engineers will take place, now that the ice has been broken and both sides have taken the first step. American engineers learned much when abroad a couple of years ago and already all of the foreigners are pleased with the insight they have been given of American production methods. There are always two sides to a question and there is no better way of making progress than to get together. The automobile is an international creation, a machine built in a particular country but used in all the lands that make up the continents. The get-together spirit is needed more than in many other industries. The greater the standardizing work that can be mutually accomplished the better for maker and consumer. Visits of this nature are bound to bring people closer together and in this age of international congresses of peace, international congresses of good roads, international congresses of commerce and international congresses of government and chambers of commerce, the automobile industry would not be keeping step with the march of progress if it failed to work for closer international relationships in matters of design, manufacture and production. It is to be hoped that annual visits may be stimulated, or if once a year should prove too frequent, not more than 2 years should be the interval between visits.

Unpreparedness Is Costly

INDIANAPOLIS' 500-mile race was slower this year than last because of unpreparedness on the part of several contestants and because of much greater caution in driving by not a few of the best-known pilots. True the motors were limited to 450 cubic inches displacement as compared with 600 cubic inches a year ago, yet this reduction of 25 per cent. in capacity was not the major reason for the reduction in pace for the entire distance.

Scarcely one-half of the cars were racing fit. Some of them were not any more fit to start in the race than a drug store clerk would, without training, be fit to start in an Olympic marathon. Others had new motors, new sets of cylinders being put on the day before the race, and nothing but dropping out before the race was well under way was all that could be expected. With other entrants there was not sufficient time previous to the race, to test thoroughly the running gear parts and gasoline tank leaks gave more trouble than motor defects.

In spite of the years of experience American makers have had in preparing cars for severe contests, a majority of the factories are slow to learn the lessons of the early bird. Last week's race has proven once more that the car to endure the gruelling punishment of 500 miles is the car that has been well run in, several of the foreign cars that finished having had many thousand miles of previous running.

It is one thing to design and build a racing car and it is another thing to get it ready for the race. The best-designed and best-built car in the world will generally fail signally in a contest if it has not been previously prepared for the fray; whereas a relatively inferior machine may make a surprising showing if it has been well groomed for the work. The cylinders must be worn in; the bearings must be worn in; and a hundred other parts must be worn in. After being worn in the motor or other part has to be taken apart, every iota of worn material removed, every part thoroughly cleaned and then re-assembled ready for the final trial run.

The exceptional amount of oil on the track held the speed down considerably, a fact which led to the utmost conservatism, translated by many as being good judgment in order to get a share of the $50,000 prize money.

The enormous consumption of gasoline and oil by some contestants directs attention to making fuel economy a factor in such a race, a factor only in that a contestant must not use in excess of a determined maximum. Such a regulation would apply with equal effectiveness to lubricating oil also. In last week's race one car averaged 23 miles to the gallon and landed well up with the leaders. Compared with this some others averaged but 5 miles to the gallon.

This year's victory of a foreign car is bound to give this classic a greater following a year hence, in fact, it will be surprising if the $50,000 does not attract a galaxy of foreign racing stars and the premier racing machines of Europe. Those who participated this year will surely return and each is bound to bring others over because of his tale of American gold. Viewed from a contest viewpoint the French victory will do more to stimulate American entries next year than if an American made machine had won.

The Growing Popularity of Electrics

From a Paper Read by H. H. Rice at the Recent Convention of Electric Vehicle Makers in Boston.

THE encouraging feature of the growth of sentiment in favor of electrics is not limited to those who derive profit from them. The public itself acknowledges the desirable features of the electric car in ever-increasing numbers. There are thousands of owners of automobiles, who, if they were to make their automobile investment over, would find in their stable a place for an electric. They will do this eventually, as is shown by the large number of gas cars which are traded in for electrics and many more which are offered in trade.

Another indication of the growing popularity of the electric is that manufacturers and dealers in gasoline cars have changed their attitude of outright contempt or good-natured tolerance to recognition that the electric, both in the passenger and truck vehicle, is a car which in its own field is unequaled by the gas car.

Only a few years ago, the manufacturer of a gasoline car looked upon the electric as a toy or a car for the woman or the man who did not dare, but today they have been forced by figures of cost and maintenance to acknowledge that the electric cannot be ignored for service and that in spite of self-starters and all the other improvements the electric is par excellence the car of convenience for city use.

Electrics Really Necessary

It hardly seems in place to argue for the growing popularity of electric vehicles to those who are entirely familiar with the fact, but sometimes we do not see best the things that are nearest to us and when we hear of the tremendously large scale of gasoline vehicles we wonder if the electric is really growing as fast as its friends and well wishers would have us think. But it is really becoming an important numerical factor.

According to THE AUTOMOBILE there were in October, 1912, some 33,842 electric pleasure cars registered in the United States, while the new registration for the year was 5,550, showing a growth of 20 per cent. These figures show that there are half as many electric vehicles in use in this country as there are automobiles of all types in France or any other of the leading countries of Europe.

At present there is no accurate way of obtaining a definite report on the actual number manufactured except by very tedious inspection of the registration records and from these, owing to the different laws of the various states, it is difficult to obtain satisfactory information.

However, one only needs to look about and to count the large number of new firms manufacturing vehicles to know that at least from that source there are a great many electrics being placed on the market. Then, by noting the number of new vehicles of the older manufacturers which are seen on the streets, further proof is added of the increase. One has but to look about him in any city of the country, except the East, perhaps, to realize to what extent electric vehicles are used, and even in the East itself people are beginning to take up the electric pleasure vehicle.

For a number of years, indeed, certain sections of the East have shown a larger use of the electric commercial vehicle than anywhere else in the country.

It is generally considered in the automobile trade that the gasoline car and the electric occupy different fields and there should be no active competition between them. It is a fact, however, as we all recognize, that many owners of gasoline touring cars have become so accustomed to the use of their machines that they employ them without considering the cost in daily service, to and from business and in their pleasure rides in and about the cities in which they live.

The general use of high-priced touring cars for both city and country service is one of the most expensive and uneconomical fads of the day. It is much the same as if the carriage owner of 50 or 100 years ago had insisted on driving a stage coach on city streets because it was necessary to use such a vehicle for long-distance work on country roads.

The electric pleasure car as it is built in this country fills the place of the fashionable pleasure vehicle as it was used before the introduction of the motor vehicle. It has all the speed allowed, or mileage necessary, within the city limits.

It is built with greater luxury than the most fashionable carriages of the last generation and it has every advantage over the gasoline car for daily service. It is simpler in construction, free from all the mechanical troubles that beset the gas car and far more economical to maintain than any gas car.

The man who has $4,500 to invest in automobiles will do well to consider whether he can find a better investment than a $3,000 electric for city use plus a $1,500 gas car for touring purposes.

It is now 21 years since the first electric vehicle was seen on the streets of Chicago, but it was 5 or 6 years after that that they began to be manufactured. If it were not for the phenomenal growth of the gasoline during these later years, the increase in the use of the electric vehicle would itself be considered phenomenal.

The growth of the business has never taken on boom proportions and hence has not been subject to the fluctuations that have affected the gasoline car industry. The increase in the demand for electrics has been sufficiently moderate to be a normal and healthy growth and it has never been stimulated by an extraordinary amount of free publicity.

Yet the electric has done a very, very large amount of straight advertising in proportion to its business and the advertising done by the manufacturers has always been in advance of the volume of business. They spend a larger percentage of their gross business on advertising account than almost any gas car company.

It is accordingly not surprising this year to find the manufacturers of electrics working at full capacity and in some cases increasing their product over last year's business, a result that can be largely attributed to the increased advertising.

Today there is no manufacturing industry in the United States that is more firmly established, more safely within the bounds of its legitimate field than the electric automobile business.

As for the car itself, it may well be claimed that while many improvements, small and great, may be looked for within the next few years, as in the past, it is at this moment a highly developed, well-balanced piece of mechanism which runs with comparatively little attention.

What I have said about the general attitude of the public, the central station men and the gas car manufacturers as to the growth of the electric, applies both to pleasure and commercial vehicles, but I cannot help referring particularly to the steady growth of the electric truck and delivery wagon business, and the increasing importance of that side of the industry. The field of the electric pleasure carriage, as now built, is already pretty well defined and its future growth may be predicted with some degree of certainty. The field of the electric commercial wagon has hardly been explored as yet. There is an immense opportunity for the use and distribution of electric motor wagons which remains to be opened and exploited. It is the undiscovered country of the future and the growth of that branch of industry is likely to be one of the phenomenal developments of the next few years.

Commercial Vehicle Growth

This growth of the electric commercial vehicle is all the more remarkable because the comparatively few manufacturers have had to make headway in face of the competition of a hundred manufacturers of gasoline trucks. Nearly every manufacturer of gasoline pleasure vehicles puts a commercial body on his chassis and thus has an outlet for his surplus stock or obsolete styles. He can make a demonstration on pneumatic tires, which will, of course, be excellent in speed and in performance, but day in and day out and year in and year out the electric invariably shows the lower cost per package.

Let us continue persistently to claim for the electric the advantages which it so surely possesses, be careful not to claim superiority in fields where it is not as yet superior, and show by our deeds as well as our words that we believe everything we claim.

Fig. 1—Neat hat for touring in white ratine with rose colored band. Listed at $3

Fig. 2—Smart reversible bonnet in red silk with visor of black flexible hemp straw. $6.50

Fig. 3—Close-fitting gray bonnet with turned over brim and trimmed with bow at front. $2.25

Fashions for the Woman in the Automobile

This Year's Dustcoats Are Smartened with Colored Trimmings—Hats Show an Interesting Variety of Design

THE touring season is rapidly approaching and within a few weeks thousands of happy automobile parties will be skimming along the open highways drinking in the scenery in its springtime freshness. Such a party forms a pleasing picture, always granting that the load of enthusiastic tourists includes a proper complement of members of the fair sex in holiday raiment. None know this better than the ladies themselves and their taste in clothing that combines neatness of appearance with comfort and the peculiar demands of automobile travel is reflected in the extensive display of motor wear at present being eagerly examined at the supply store counters.

Lightness of material and looseness of fit so as to allow that ease from which a considerable part of the pleasure of automobiling is derived, mark the latest developments in motor garments for both sexes. And the designers have so worked that these desirable features are obtained without in the least sacrificing the charm of graceful lines. All through the range of coats, dusters, waterproofs, slip-ons, etc., on the ladies' counters are strong evidences of the hand of the artistic designer.

Perhaps the most noteworthy direction in which development is passing is that of reducing the number, weight and bulk of the garments which it is necessary to carry in order to provide for all possible weather contingencies. Formerly the waterproof was too warm for the midday sun, and the necessity of changing into it at every summer shower was rightly considered a trouble that should be avoided. This brought about the introduction of rubberized garments in gabardine, silk and other materials light enough to perform the ordinary duties of the duster. For a warm showery day these garments are ideal.

Fig. 4—Popular type of linen duster with color relief of blue or red for the collar and cuffs. Listed at $7.50

Fig. 5—Linen dustcoat trimmed with white and tan leather. The oblique front gives a distinctive appearance. Price $29.75

A few years ago it was customary to meet the cold air of evenings with a massive coat whose bulk monopolized an undue share of the baggage space on the car when it was taken off. This has been remedied by the use of garments made from closer cloths, with more attention paid to the correct design of collars and buttoned parts, and by the use of wind shielding devices at the wrists. By these means it is now an easy matter to keep warm without acting as a support for a weighty top coat. This duality of purpose of the lighter wear and reduction in bulk and weight of the heavier renders the all important question of what clothing shall we carry one that can be faced with comparative calm.

In order to provide that freedom of arm movement which is essential to comfort while sitting in the car and also to insure the least damage by crushing to delicate wear underneath the top coat it is

the universal custom in motor garments to provide roomy arm holes and shoulders. This perhaps explains the popularity of the raglan type of sleeve, although the particular advantages that were formerly associated only with that cut of shoulder are now incorporated in garments having the regular coat sleeve.

Of all the garments that are necessary parts of the woman motorist's wardrobe none is so indispensable as the duster. This year's display of these garments is bewildering in its variety. Scarcely any are on show that cannot claim a share of attractiveness in one way or another. The introduction of colored trimming of some sort adds considerably to the appearance of many of these summer garments. In Fig. 5 a particularly neat example of this use of contrasting color in a linen dustcoat is shown. In this the collar and wrist cuffs are of tan leather with a narrow border of white, also in leather. The collar is provided with a buckled strap so that close fitting at the neck is an easy matter. Similar adjustable fasteners are attached to the cuffs to keep out the wind. A helf belt of tan and white leather, in uniformity with the collar trimming, contributes to the smart appearance of the back.

Fig. 6—Tan mackintosh with close fitting military collar and wrist bands. Supplied with raglan shoulders or the ordinary inserted coat sleeves. The wrists have inner wind guards. Price $15.

Fig. 7—Very light, double-breasted shower proof of white rubber fitted with black collar and wrist facings. This garment is furnished with large side pockets with wide flaps. Price $10.

Fig. 4 also demonstrates the enhanced appearance that is obtained by the introduction of a slight splash of contrasting color on an otherwise plain garment. This duster, supplied in linens and mohairs, has a collar of a light shade of blue or red with the cuffs to match, and is a most popular type for summer wear.

Linen has the advantage of easy laundering, but where a dustcoat of a more dressy appearance is wanted the prospective purchaser has a wide range of silks and other fine materials placed before her. The duster shown in Fig. 13, for instance, and supplied in pleasing shades of blues and grays, fits the case. It is an extremely light garment and has the advantage of being shower proof. The skirt is long and roomy and the side pockets are of a useful size.

Another silk coat for the dressy motorist is illustrated in Fig. 12. This is in rubberized Italian silk with a convertible collar and raglan shoulders. The sleeves are comfortably wide and are furnished with the conventional buttoned wrist strap. The neat appearance of the collar with the lapels buttoned up is well brought out in the illustration. In the heat of the day when a breeze about the neck is welcome the open position of the collar will be found to look equally well.

A mannish mackintosh of the conventional type is shown in Fig. 6. This is a single breasted garment in tan with a close fitting military collar. Slash pockets at the side are provided and the sleeves are furnished with wind cuffs and outer wrist straps. It is supplied in both raglan and the regular coat sleeve forms.

For those who prefer an extremely light waterproof the white rubber illustrated in Fig. 7 can be recommended. As will be seen, this is a double-breasted garment of a very smart appearance. The collar and cuffs are black, and wind guards are fitted to the wrists. The side pockets are of the patch type furnished with wide flaps. Such a coat can be folded up into a very small compass, and its price, $10, is astonishingly small when its neat appearance is taken into account.

Fig. 11 shows a tan leather coat that somehow seems to suggest that the wearer has a thorough knowledge of the mechanical details of her car. Not that it is designed primarily for the lady driver—it is a handsome garment for any one in the car—but it smacks more of the automobile than those previously described. The leather is extremely soft and pleasant to wear and with the collar raised as shown in the picture forms ample protection against the elements. The single row of buttons pass through a storm flap that produces a perfectly sealed joint

Fig. 8—Mica mask inserted into crepe de chine veil. Ventilating holes are provided. Price, $4.50

Fig. 9—Handsome silk bonnet with veil permanently attached to front of brim. Listed at $12.50

Fig. 10—White corduroy hat that is easy to wear and always looks well. The price is $2.95.

Fig. 11—Top illustration shows handsome tan leather coat provided with high, close fitting collar, wrist guards and storm flap under front buttons. The leather is pliable and comfortable to wear. Lined with plaid silk this garment sells for $49.50

Fig. 12—Light, skeleton-lined shower proof in rubberized Italian silk of a pleasant gray shade. The collar is of the convertible type, permitting closed or open neck and straps are fitted to the wrists. It is listed at $42.50

Fig. 13—Bottom illustration shows an extremely light duster in gloria silk, fitted with the conventional lapel collar and wrist cuffs. It is treated so as to resist summer showers and is supplied in various shades of blue and gray. Price, $22.50

Fig. 14—Left, showing smart side view of silk and straw bonnet shown in Fig. 2. $6.50

Fig. 15—Right, smart sailor straw hat that is useful in the blazing sun. Price $10

to the exclusion of wind and rain. Wind cuffs are also fitted to the wrists.

Turning now to the heavier wear, a general utility overcoat that will protect against the cold snaps of evenings at this time of year and at the same time act as a useful touring garment for day travel during the cooler seasons, is a necessity in the woman motorist's wardrobe. For such a coat the check pattern will always remain popular. The front and back views of a particularly handsome homespun overcoat in black and white check are given in Figs. 18 and 19. The collar is supplied in a light red or blue with piping at the buttons to match. This small relief of bright color from the black and white of the material is an exceedingly happy combination. The lapels are of the flexible order that is becoming increasingly popular, permitting of a close fitting up to the neck when desired. The buttons are of the same check material as the coat. Fig. 19 shows the distinctive appearance of the back, obtained by the use of a diagonally buttoned panel effect.

Another heavy coat that will defy the cold winds is shown in Fig. 20. This is in English tweed of a plaid pattern with a collar in broadcloth of contrasting collar. As will be seen, the buttons are massive and arranged in two sets at the side. A broad half-belt at the back, button-trimmed, agrees with the wide form of buttoned cuffs.

Favorite Colors Are Grays and Browns

Color tendencies this year show the grays and browns to be increasing in favor, these quiet tones being generally relieved however, by a judicious use of small quantities of brighter hues in the way of trimming. The use of belts and the various forms of button trimming has also had the effect of destroying the monotony of line of a garment.

It may not be out of place to mention here the great utility of the ordinary woolen sweater in connection with the wardrobe of the woman motorist. They are easily carried and are generally provided with ample pocket space. This latter is a point which should not be forgotten by the tourist. It will be noticed in respect to other garments, too, that the convenience of these receptacles of gloves and the numerous other things which on tour are always wanted in a handy place has not been overlooked by the makers of automobile wear this year.

The question of headwear has received special attention at the hands of the designers. The automobile hat must have the feature of being easily held to the head in a wind. And a great variety of hoods, bonnets and soft hats are to be had possessing this desirable feature. Fig. 1 shows a ratine hat in rose and white that is flexible and has a neat, comfortable appearance. This type of headwear can stand a good deal of knocking about and therefore is popular with those who mean to have all the fun of a tour without wasting too much thought on the care of wearing apparel.

Fig. 16—Left, reversible bonnet of flexible hemp straw with silk crown covering. Listed at $5

Fig. 17—Right, showing the charming effect of the veil and hat combination illustrated in Fig. 9

The center illustration, Fig. 2, shows a charming bonnet of the visor type. The crown is loosely arranged silk of a bright red shade, while the visor is of black hemp straw with black ribbons attached. A bonnet of this type has the merit of affording protection to the eyes in the sun rays and is close-fitting enough when tied to defy the wind. A view from the side is given in Fig. 14.

A neat hood in light gray with bow trimming of the same material and color is shown in Fig. 3. This hat harmonizes pleasantly with almost any light duster.

For those who use a veil to secure the hat the bonnet shown in Fig. 9 will be found suitable. In this the veil is permanently attached to the front of the hat, which is a gray silk and straw combination. The appearance of this particular hat with the veil in place is shown in Fig. 17.

Fig. 10 shows a popular hat for the sporting tourist. It is a white corduroy and looks exceedingly well in the open against the green background of trees and lawns.

The sailor hat shown in Fig. 15 is useful in sunny weather and is capable of withstanding a good deal of rain without any serious result.

Reversible hats are meeting with a ready demand. The one shown in Fig. 16 represents the most usual design. A flexible weaving of hemp straw is used, covered on one side with a silk crown. By merely turning the hat outside-in the effect of another hat is instantly produced.

The Colored Veil Is Popular

Among the minor details of wear that are of importance to the woman who finds that the continual facing of the wind has a serious effect on the complexion, veils should receive careful consideration. This year a veil that is meeting with much favor is one in which a graded effect of color, somewhat reminiscent of the treatment of skies in Japanese prints, is introduced. The color is deep at the ends where it makes up into a bow with charming effect, and gradually fades into the natural transparency of the chiffon over the face.

In choosing a veil for automobile wear it should not be overlooked that ample size and closeness of material are the two essentials if a real dust excluder is desired.

For the woman motorist who never feels comfortable wearing goggles and yet desires a protection for the eyes the mica mask in Fig. 8 is worth consideration. The plate of mica is inserted into a veil that is tied about the hat, supporting the transparent surface in a suitable position and allowing a wide view.

THE AUTOMOBILE is indebted to James McCreery & Co., New York, for the use of the garments and hats shown in Figs. 3, 5, 10, 11, 13, 18, 19 and 20; to Saks & Co. for those illustrated in Figs. 1, 6, 7, 9 and 12, and to The Auto Supply Co., New York, for the duster shown in Fig. 4 and the hats in Figs. 2, 8, 14, 15 16 and 17. Photographs by N. Lazarnick, New York.

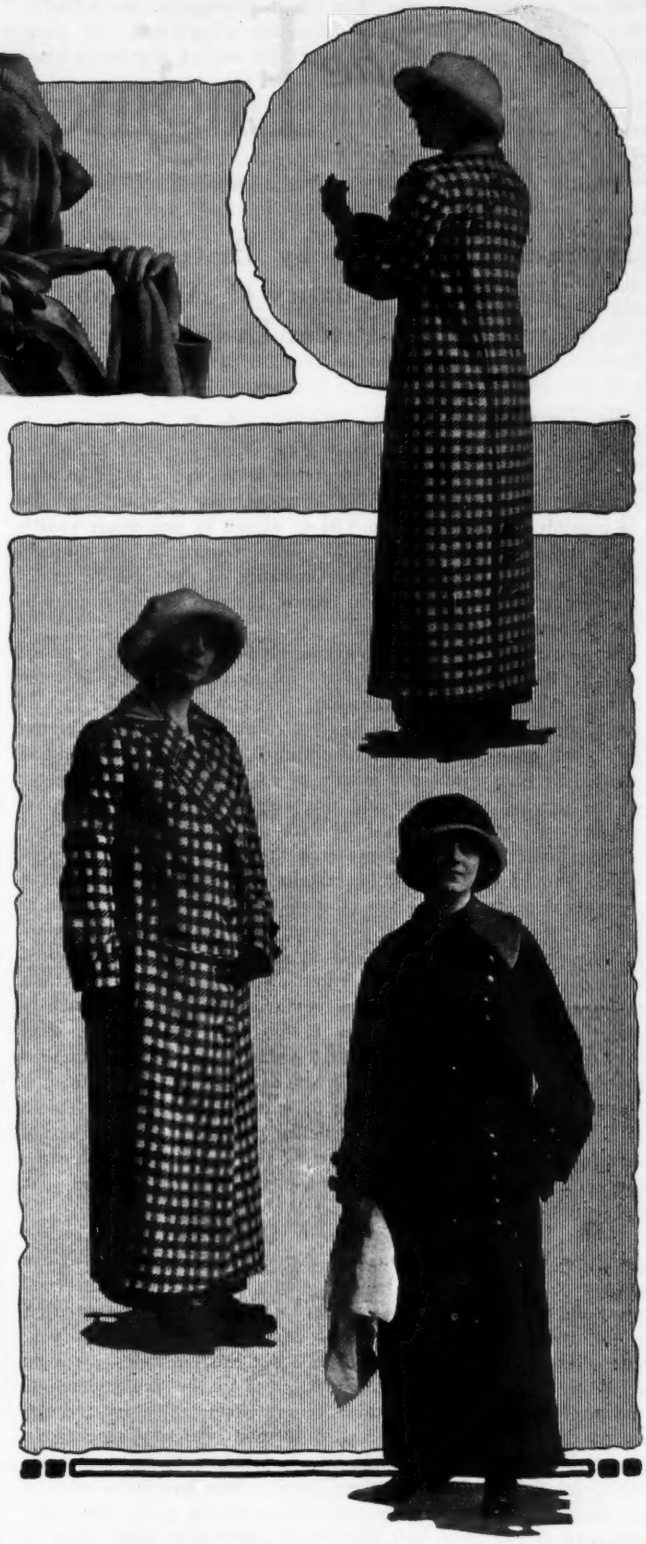

Fig. 18—Top illustration shows back view of a smart coat in black and white check homespun. The neat appearance of the back with the obliquely buttoned panel effect will be noted. The collar is of a bright blue or red. Listed at $38

Fig. 19—Another view of the garment shown in the upper illustration, showing the trimming of the collar. This collar has flexible lapels so that they can be buttoned up close or as shown. Piping at the wrists and buttons of the same color as the collar

Fig. 20—Heavy coat in English tweed with yoke effect and novel arrangement of buttons. The wide cuffs and a wide half belt at the back are button trimmed. The collar is in broadcloth of a contrasting color. Price $37.50

The Engineering Digest

Interesting Attempts by British Engineers at Establishing Objective Standards For Judging the Quality of Automobiles—Results With Naphtaline as Taxicab Fuel—Patent Law Under Revision—Balloon Material For Tops

RATINGS of Cars by Co-efficients K and Sigma—In the *Automobile Engineer Year Book for 1913* (London) 16 pages of text and reference tables are devoted to what is called "the co-efficient K," by the proper use of which it should be possible to compare the merits of design of one motor vehicle with those of another, especially with regard to hill-climbing capacity, if the best possible performance of each vehicle under a given set of conditions is on record, the two sets of conditions not necessarily being identical.

K figures out to a number averaging between 120 and 130 for sporting cars, between 100 and 110 for touring cars and between 80 and 90 for commercial vehicles. It is composed of the factors from which motor power is figured, combined with those giving the total gear-translation (revolutions per minute of engine divided by revolutions per minute of road wheels), the diameter of the driving wheel tire and the weight of the car with passengers. K, standing for these data of construction expressed in one numerical value, represents the chosen design features which should make possible certain performances, and these theoretical performances are tabulated for values of K ranging from 400 to 30, and for different road conditions, the performances corresponding closely, it is stated, to those obtained with the best cars in the market. Now, by consulting these tables and comparing the actual performance of a car which is under investigation, and whose K has been figured out, with the tabulated performance for its K-value, it can be seen whether the performance falls behind the standard or not. If it does, it stands to reason that the design or workmanship of the vehicle falls below the standard of excellence at present attained at the best factories at some one or more of the points which influence the car's work but which are not included in K, or else that the condition of the car has suffered by use or neglect.

Under the title "The Co-efficient Sigma," H. Kerr Thomas proposes in *Internal Combustion Engineering* for April 2 to use another co-efficient which he calls sigma, and which is patterned after the co-efficient K, for comparing the gasoline consumption of different types of automobiles, and the components entering into sigma are so chosen that not only the ton-miles involved in a performance are considered but also the dimensions of the motor and, the author says, its volumetric efficiency and the degree of perfection with regard to fuel economy reached in the carbureter with which the car is fitted, it being apparently the view of the author that these features may have been selected by the car builder or owner for reasons having to do with convenience of operation and considered superior in importance to fuel economy. In other words, the co-efficient sigma serves to determine the fuel efficiency of a car in so far as it is determined by other factors than those most directly concerned, especially by the mechanical frictions in gears, tires, motor and bearings. The road resistance is left out of consideration, however, so that comparative tests should be made over identical stretches of road.

In contrast to this reservation, the tables for co-efficient K, above referred to, are figured out with reference to several classes of road surface, for each of which a certain co-efficient of road resistance is assumed, and those making use of the tables must estimate whether the road over which the performance under investigation takes place conforms nearly enough to one of the types scheduled in the tables or an allowance should be made for the variation.

The co-efficient sigma, as first devised with reference to the factors to be considered, takes the following form:

$$\Sigma \text{ (sigma)} = \text{Constant} \times \frac{D^2 S N g T}{d W}$$

in which D is bore, S stroke, N number of cylinders, g the total gear ratio, T the presumable gasoline consumption in ton-miles per gallon, (so that 1 divided by T becomes the consumption in gallons per ton-mile), d the diameter of driving-wheels in inches and W the weight of the car in tons. The value of the constant is determined by a consideration of the weight of the air and gasoline vapor theoretically consumed for a given piston displacement per mile, and the weight of the car is supposed to increase this consumption proportionately.

By evolving the equation on this principle, the formula reaches the final form:

$$\Sigma \text{ (sigma)} = 0.0039 \times \frac{D^2 S N g M}{d}$$

in which M represents miles per Imperial (English) gallon, and in which the weight element has been cancelled out through the fortunate circumstances of being represented in M. For use in America, where the gallon is 1.2011 times larger, the constant is changed accordingly and becomes:

$$\Sigma \text{ (sigma)} = 0.0047 \times \frac{D^2 S N g M}{d}.$$

By taking the fuel consumption officially recorded for a Rolls-Royce car as an example of good fuel economy and figuring out the value of sigma for its performance, finding it to be 4.7, the conclusion is reached that 5 might be accepted as the maximum value likely to be attained for sigma at any car performance. If fuel other than gasoline of about .750 specific gravity is employed the constant 0.0047 must be modified.

[A cursory study of the system proposed by Mr. Thomas in this formula does not seem to disclose in what manner the volumetric efficiency of the motor and the qualities of the carbureter have been set aside and eliminated from consideration. As these factors are not found among those of which sigma is composed, it seems that they should be among those to be held responsible if a given car performance falls short of the standard.—Ed.]

REVISION of French Patent Law—A government bill is now before the French parliament according to which it is proposed to extend the life of patents from 15 to 20 years, to change the present annual tax of 100 francs to 25 francs for the first year and an additional 25 francs for each succeeding year and to establish a special form of patents for "small inventions" expiring in 5 years and taxed only 25 francs annually. The latter provision is criticised as likely to give rise to ambigu-

ity in distinguishing between great and small inventions as well as eventual dissatisfaction to inventors who for the sake of momentary economy try to get along with protection for only 5 years. The total tax during the lifetime of a patent, according to the new bill, would amount to 5,250 francs, while at present the total is only 1,500 francs. It is mentioned as one of the reasons for proposing lower rates for the first years—the first including the fees for securing the patent—that French inventors now, in order to save initial expense on an invention, frequently apply first in Belgium where the fee is only 10 francs. By doing so, they gain protection for one year, during which they can try to make sure of the commercial value of the invention while still retaining all their rights in those countries which are members of the Patent Union. [The text does not state clearly if the year runs from the date of application in Belgium or from date of issue of Belgian patent. Those who may be interested—since the United States also are members of the Patent Union—are referred to their patent attorneys for responsible information on this point.—ED.]—From *Omnia*, May 10.

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TAXI Run 62 Miles on 20 Cents Worth of Fuel.—The fuels now regarded as possible substitutes for gasoline in motors of small size and light weight include benzol, coal spirits (meaning the fluids), practically equivalent to gasoline, which have been distilled in large percentages from coal, especially cannel coal, in England), kerosene, enriched alcohol, dissolved acetylene (absorbed in acetone) and naphtaline; also shale oil products, of which some resemble kerosene and others gasoline. Hereto comes that methods have been devised for combining the highly volatile naphtas contained in crude oil with other constituents of the same raw material in a manner which is almost equivalent to synthetic production of gasoline and immensely increases the percentage of it obtainable from the petroleum fields; it being stated, even, that much of the gasoline now in the market is produced by these improved methods. In making this list, no account is taken of the possibility of developing the Diesel motor to the point of making it applicable to automobile and kindred purposes and getting the benefit of the heavy oils and tars with which motors of this type can be operated in the sizes and weights suitable for stationary and marine work.

Among the proposed substitutes for gasoline, some are susceptible of unlimited production, especially enriched alcohol and acetylene, but questions of cost and adaptation to existing motors have retarded the testing-out of their fitness. The coal spirits, too, are probably obtainable in sufficient quantity to compete effectively with gasoline and limit the upward tendency of its price.

Now, however, the very number of the substitutes coupled with the development of carbureters by which fuels of different density and composition may be successfully handled in connection with motors of the type in common use, or only slightly modified, forces into the background, somewhat, the question of the quantity of each fuel which may be put into the market and raises to greater importance, on the other hand, the question of what may be done with each of these fuels, on the assumption that the field for light motors is broad enough to admit of finding suitable uses for each variety, while all of them in combination will check the fuel famine, with its attending evils, more efficaciously than any one of them could be expected to do. From this new viewpoint, the results lately achieved with naphtaline—so far the cheapest of all the fuels mentioned—gain an interest which is not limited to the European countries, where the fuel question has become one of vital urgency intimately allied with the problems of national defense.

From the tests of naphtaline reported by L. Ventou-Duclaux, one of the engineers of the Automobile Club of France, it appears that this substance might well be used for heavy hauling of earth, rock and ore and perhaps for omnibuses.

The tests were conducted with a Renault taxicab whose 2-cylinder, 12-horsepower motor had been modified for the purpose, the modification consisting mainly in replacing the ordinary carbureter by the apparatus illustrated in Fig. 1, which was developed in two years of experiments conducted by G. Mohr. It consists in the double carbureter shown in subfigures 1 and 2 and the device for melting the solid naphtaline shown in subfigure 3. The latter comprises a receptacle A heated interiorly by leading a coil of pipe from the exhaust around the wire-gauze filter *c* in which the solid naphtaline is placed and which retains the impurities which it may contain. The melted naphtaline runs out through the fine tube *d*, which is so paired with the exhaust branch pipe D that the fuel arrives in the carbureter at a temperature higher than its melting point. The carbureter is also heated by the exhaust gas, which arrives through the wrapped pipe D'. A third branch D" from the exhaust manifold connects with the upper end of the coil *c*. Butterfly valves G and H in these pipes admit of regulating the heat, as between the receptacle and the carbureter. The double carbureter has two float chambers, one for gasoline and the other for the melted naphtaline. The latter is cast in one piece with the atomizing-chamber above the jets, so as to equalize the temperature in these two parts and avoid precipitation of the fuel vapors. The two jets I and I' converge toward the same atomizing-chamber, which is placed, as shown in subfigure 2, between the chamber L, filled with exhaust gas, and another chamber in which the surplus air arrives regulated by a sliding-sleeve and the wingnut *e*.

The naphtaline used in the test was of the crude variety tapped from the still of which the price is 6 francs per 100 kilograms in 5,000 kilogram lots in Paris, near which city it is produced. The test was conducted over a stretch of road 52.7 kilometers long which was covered in both directions. The laboratory engineers of the *Conservatoire des Arts et Métiers* were in charge. The motor was started a few minutes before the beginning of the test, so as to make use of no other fuel than naphtaline for the recorded time.

The results were as follows: The test lasted 3 hours, 19 minutes, 30 seconds. Stops of the motor aggregated 15 minutes 30 seconds, making elapsed time 3 hours 4 minutes. The distance covered was 105.4 kilometers. The road was a macadamized one in good order and with moderate grades. The average speed was 34.4 kilometers per hour with a maximum observed speed for one kilometer of 42.3 kilometers per hour. The total consumption of fuel was 14.996 kilograms, making a consumption of 14.228 for 100 kilometers.

The motor was started on naphtaline without difficulty after injection of gasoline in the cylinders. During the test it functioned normally and regularly, without skipping or knocking. There was little smoke in the exhaust and that only on the upgrades. Restarting after stops was effected without injection of gasoline. On the following day it was ascertained that the compression had remained normal and that the motor was not gummed up but in good working order. No deposits or abnormal fouling of the different organs was observed when it was taken

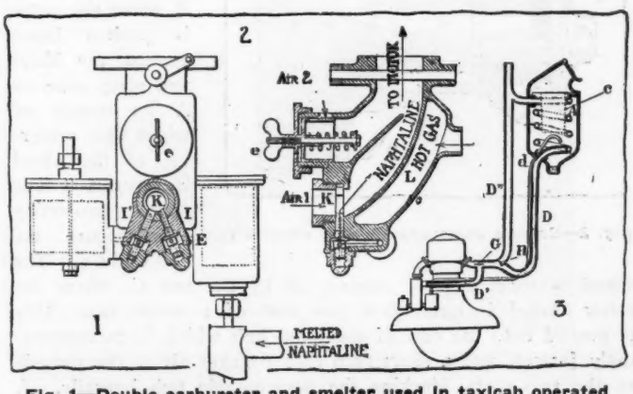

Fig. 1—Double carbureter and smelter used in taxicab operated with naphthaline as motor fuel

apart. There was, especially, no precipitation of naphtaline in the crankcase.

A supplementary test was conducted to find out how long time was required after starting the cold motor on gasoline before the naphtaline could be switched in. It could be done after 13 minutes 37 seconds, although at that moment the naphtaline in the receptacle was not yet all melted. After a stop of 10 minutes, the motor could be restarted on naphtaline without difficulty, while after another stop lasting 16 minutes an injection of gasoline in the cylinders was required to help out.

The figures, as given above, bring the cost of operating a taxicab on naphtaline over 100 kilometers, at the speed mentioned, to 0.85 franc, and if the cost of the gasoline necessary for starting is counted, the total fuel cost for 100 kilometers barely reaches 1 franc. With gasoline alone, 10 liters would be consumed, costing 5 francs.

The weight of the motor, carbureter and melting apparatus did not reach 10 kilograms per horsepower.

The annual production of naphtaline in France amounts at present to 30,000 tons, while Germany produces 175,000 tons, England 126,000 tons and Belgium 1,200 tons. The price varies according to the purity of the product and the transportation cost, ranging from 5 francs for 100 kilograms at Antwerp to 14.75 francs for German naphtaline delivered in Paris. Until recently the marketing of crude naphtaline has been extremely difficult, and the production was therefore restricted as much as consistent with the rectification of the coal oils and tars of which it is the by-product. The moment the tar distillers gain a ready market for their naphtaline, this condition will be changed, since it will be to their interest to produce as much as possible, thereby also improving the grade of their main output. Besides, a larger market is likely to be created for the tars, as soon as they can be made more economically. These things going hand in hand, it is then probable that naphtaline can be produced in much greater quantity than is now the case, and that it will rise to a considerable importance as a motor fuel, especially for heavy hauling.—From *Le Poids Lourd*, May 10.

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BALLET'S Removable Wire Wheel.—A simple construction serving the purpose of having a wire wheel substantially secured to and yet easily removed from the fixed ball-bearing hub which remains mounted on the axle-end, is shown in Fig. 2. It is designed by Ballet, and the mechanism, like that of some other demountable French wire wheels, seems inspired by gun mechanism. The fixed hub A has a semi-circular projection *a* against which abuts a similar projecting flange *b* on the demountable hub B, when the latter is pushed home against the short and steep cone on A by means of which the centering of the wheel is secured. The two projecting rims secure the rotation. The wheel is secured from coming off by the nut C, whose interior thread is interrupted like that of a screw tap. This is pushed onto the end of the fixed hub which is correspondingly formed, and a short turn then engages all of the threads of the two parts, blocking the demountable hub laterally. A spring clip engaging ratchet teeth in the face edge of the fixed hub obviates rotation of nut C. The cap D protects this clip. T is the brake drum, forming part of the fixed hub.—From *Omnia*, May 10.

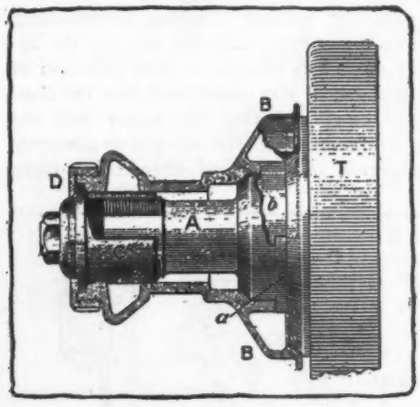

Fig. 2—Ballet's demountable wire wheel hub

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METALLIZED Textiles.—The balloon cloths covered with a thin aluminum film on one side which have recently been placed in the market are suggested as possibly of interest to manufacturers of automobile tops, as they reflect sunlight strongly, including the ultraviolet rays, and therefore tend to keep the space directly under the top cool—a feature which adds considerably to the comfort of passengers, even if the sides of the vehicle are open and particularly if the top is low and the climate tropical. The aluminum is blown upon the rubberized cloth in the form of dust when the cloth comes from the spreading-machine and while the rubber with which it is impregnated is still soft. Aluminum dust is not powdery, though it appears so, but is in reality composed of infinitely small scales, and these stick to the rubber at once and are afterwards rolled into it on the calendering machine, forming a perfectly smooth surface which sheds water quickly and, as said, reflects light rays and heat radiations. It is the last-mentioned property which makes this cloth indispensable for balloons, in view of the need of avoiding all sudden expansion of the gases which they contain, but the protection which the metal coating affords against rapid oxidation of the rubber by the sun's rays is also a matter of primary importance, meaning a much increased durability for a purpose requiring lasting gas-tightness.—From *Kunststoffe*, May 1.

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Contemporary Articles on Subjects Allied to Automobiles But Not Adapted for Abbreviation

Revue de Métallurgie for May contains a symposium of articles intended as a survey of present knowledge relating to the modifications of the properties of metals, especially steel, which are produced by mechanical working processes—as distinguished from heat-treatment—and are neutralized by annealing. One of the articles is a translation of the essay by Goerens submitted to the Iron and Steel Institute in 1911 for the Carnegie Research Scholarship. The others are by M. P. Galy-Ache on Upsetting (*écrouissage*), by M. Hanriot on the same subject and by Léon Guillet on Annealing of Upset Metal.

In *Automobil-Rundschau* for April 30 there is reproduced a paper by Dr.-Ing. Carl Büchner on the benzol question with special reference to carbureter construction. It dwells on the chemical composition of different fuels and their ignitability, on the movements of gases under different methods of throttling and on preheating of air and fuel. Illustrated. To be continued.

In *Internal Combustion Engineering* of May 14 G. H. Baillie discusses automobile spring design with illustrations of car and axle movements. He proposes to measure the jerk given by a road obstacle by means of the amount of change in the acceleration of the car produced in a finite time. The question of fitting variable loads is not taken up.

In *Der Motorwagen* of April 30 Engineer August Bauschlicher discusses fuels for explosion motors, their sources and their thermo-dynamic properties.

In *La Technique Automobile et Aérienne* for April 15 G. Lienhard analyses the movements and stresses occurring in the motor with variable stroke which was exhibited by the Itala company at the last Paris show. The variable stroke supplants the customary change-gear. The principle of the construction was described in these columns in the issue of January 4, 1912.

In the same journal an essay by Pol Ravigneaux on the reactions of transmission shafts upon their supports and an instalment of a serial by the same author upon the kinetics involved in a vehicle's capacity for "holding the road"; mathematical and relating largely to spring suspensions and tires.

The Engineers' Forum

Making More Tests in Less Space

Suggested Arrangement Gives Maximum Capacity at Least Cost

CHICAGO, ILL.—Editor THE AUTOMOBILE.—The test of the gasoline motor and its correlated parts prior to its trials upon the road is entirely taken care of by the laboratory block test. Here the assembled motor is given every conceivable load at the different speeds to bring out its characteristics. The conditions existent in the majority of automobile plants tend to sacrifice scientific accuracy and thoroughness for want of time and facilities. With a single block test equipment the allotted time for laboratory tests will not be proportionate to the number of tests and models. On the contrary, this time will be so diminished that the tests will be of an indicative nature rather than scientific proof.

The capacity may, of course, be doubled or tripled by simply multiplying the single complete testing unit, usually consisting of a bed plate for the gasoline motor and some form of dynamometer. By thus increasing capacity the time difficulty is removed and with it in consequence every opportunity is allowed for scientific thoroughness. The great objection to this means of increasing capacity is the cost.

The duty of the engineer is to find the maximum equipment purchased by the fixed allowance granted. The dynamometer represents the greatest expense when multiplying units to increase capacity. As the approved type of dynamometer is electric this expense is considerable. Not only this, but the calibration and standardizing of several dynamometers would never equal the accuracy of one common dynamometer.

The accompanying drawings represent a very compact and inexpensive means of meeting these conditions. An electric dynamometer is used common to all the bed plates upon which motors, gearsets, rear axles, etc., may be mounted for test. Thus the expense of multiplying capacity is proportional to the slight cost of adding additional bed plates and a special base for dynamometer. A still further advantage lies in the ability to use the dynamometer to absorb the power on the rear wheels of a chassis.

Fig. 1 is a side elevation of one cast iron bed plate and an electric dynamometer of conventional design. Beneath the regular stock base furnished with the dynamometer is a special subbase designed with a machined surface on which to move the dynamometer about a fixed center. The subbase should be "let in" to the flooring to keep the horizontal axis of the armature as low as possible.

Fig. 2 represents the layout of the floor plan showing the relative position of dynamometer to three bed plates A, B and C. The center lines of A, B and C are radii from the pivotal center of dynamometer base. These radii are spaced at an angle of 45° for convenience, as will be shown later, and marked on the face of each base. Thus, should a test be in progress on A, a motor may be perfectly lined with the radius of B and raised to the proper height. As soon as test on A is completed or stopped for alterations it is simply necessary to move dynamometer on its pivotal center 45° when B would be ready for test, etc. For convenience the subbase of the dynamometer is drilled for tapered dowel-pins for each position in which it may be used. As the dynamometer base proper is a square the drilled positions for A and C are the same provided the holes are drilled in corners of a square. The pins should be of sufficient taper and diameter to facilitate an approximate alignment, the driving of the pins, making the exact location always the same. When located, cap screws threaded into the subbase hold the apparatus rigidly.

If desirable the pivotal center may have a centering pin to not only keep the dynamometer centrally located, but also act as a jack with which to take the weight off the base. To do this the pin is threaded into the dynamometer base proper and has a tapered seat in the center of the subbase. However, this has not been found necessary up to 100 horsepower outfits.

The flexible cables carrying the current must have plenty of slack and be secured to the stationary frame of the dynamometer. This prevents any deflection of the scale arm outside of that due to actual power developed.

All measuring instruments reading the results of the dynamometer must likewise be connected to the movable base. Thus tachometer, revolution counter and scales will not change their relative positions with the dynamometer itself.

For testing the complete chassis the dynamometer is located as at A and suitable pulleys placed on both ends of the armature shaft. The car may then be backed into position on extended radius C. At the same time such a test will not interfere with other work set up on the various blocks.

The advantages of this system are: 1—Minimum expenditure with maximum capacity; 2—least floor space commensurate with accessibility; 3—absolute standard for measuring power common to all tests; 4—low first cost which enables the small manufacturer to have the same equipment as the largest; and 5—an expanding system which may be added to at any time.—R. M. ANDERSON, Stromberg Motor Devices Co.

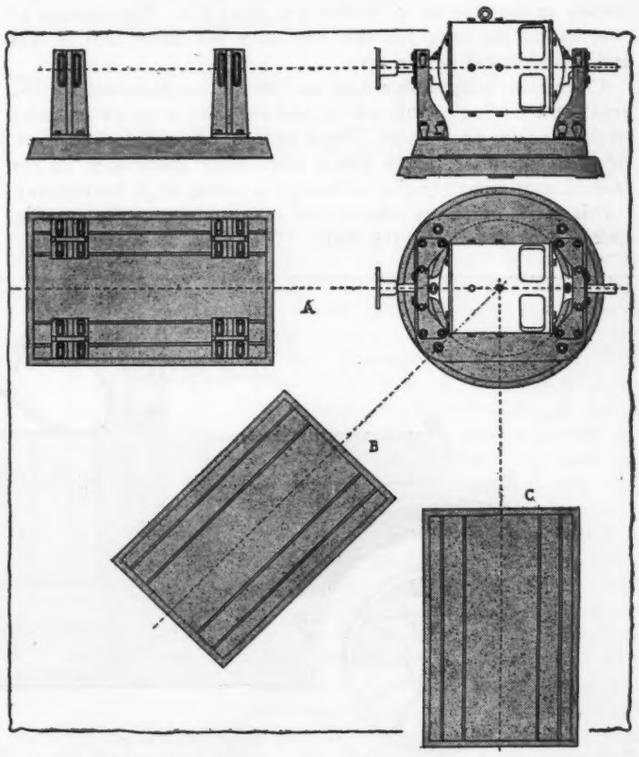


Fig. 1—Upper—Side elevation of bed plate for mounting motor in laboratory testing plant and dynamometer, showing alignment

Fig. 2—Lower—Plan view of suggested arrangement for tripling the capacity of the plant

Runabout Body Design for Paige-Detroit

Spare Tires Carried in Concealed Storage Space at Rear—Body Doors Oppositely Hinged for Ventilation of Interior

By George J. Mercer

THERE are three conspicuous essentials to consider in body designing today. These are: First, the proportioning of the body so that the comfort of the passengers is well provided for; second, the elimination as far as possible of flat external surface that would result in loss of power against the wind; and third, the provision of adequate storage space for extra parts being carried on the car.

The first two of these essentials has received careful consideration at the hands of the designers and the results are used as talking points of considerable weight by automobile salesmen. With regard to the third consideration, the provision of storage space, however, this does not seem to have been given the attention that the subject apparently deserves. Even when the space is ample the important feature of accessibility is often ignored or insufficiently considered.

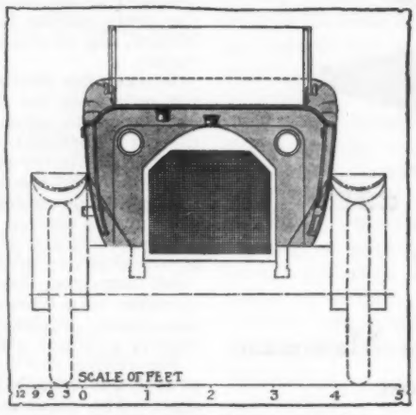


Fig. 1—Front view, showing position of gasoline filler in top of dash cowl

One matter that is receiving more attention than formerly is the disposal of the spare tires, though there is still much to be desired in the way these articles are cared for. The storage of tires inside the body has not met with the favor that it was anticipated would be the case.

A runabout body design with an interior compartment for the tires is the subject of this article, and the body is shown mounted on the medium-sized Paige-Detroit chassis, having left-side drive, 116-inch wheelbase, 34 by 4-inch tires, body space back of the dash of approximately 91.5 inches and a rating of 36 horsepower.

This car is especially adapted for rear storage, as the gasoline tank is provided for at the front. This tank, of approximately 14-gallon capacity, is standard equipment and is indicated by dotted lines in Fig. 2.

Taking the rear compartment first, this is long enough to take nicely the two tires that are considered necessary spare equipment for touring. Since the gasoline tank is provided for in front under the hood, all the space at the rear is available for carrying the tires and for luggage. In this case, the tires being 34 inches in diameter it is an easy matter to provide sufficient space. At the rear is a door large enough for the entrance of the tires. This door is hinged at the top, and at the sides and along the bottom and is made watertight by having a flanged lip, that extends inward from the inside of the door. When closed this lip enters a recess packed with either rubber or felt. At the top the hinge is continuous and keeps out the water. Fasteners are placed at each of the lower corners and in the center a hasp and padlock is fitted.

The tires are set on a tray that slides on rollers. To remove the tires, the door is first held open in the upright position, and the tray rolled out as indicated by dotted lines on Fig. 2. At the back end a hinged leg, forming part of the tray equipment, is dropped down for a support, while at the front the tray rests on the slider. The inside space of the tires is utilized by a drum that serves the double purpose of keeping the tires in position on the tray and also acting as luggage space for small articles. At each rear corner of the tray is a small triangular box that can be used for small tools. This box thus utilizes the space at the corners not occupied by the tires. Its shape and position is indicated on the plan view, Fig. 3.

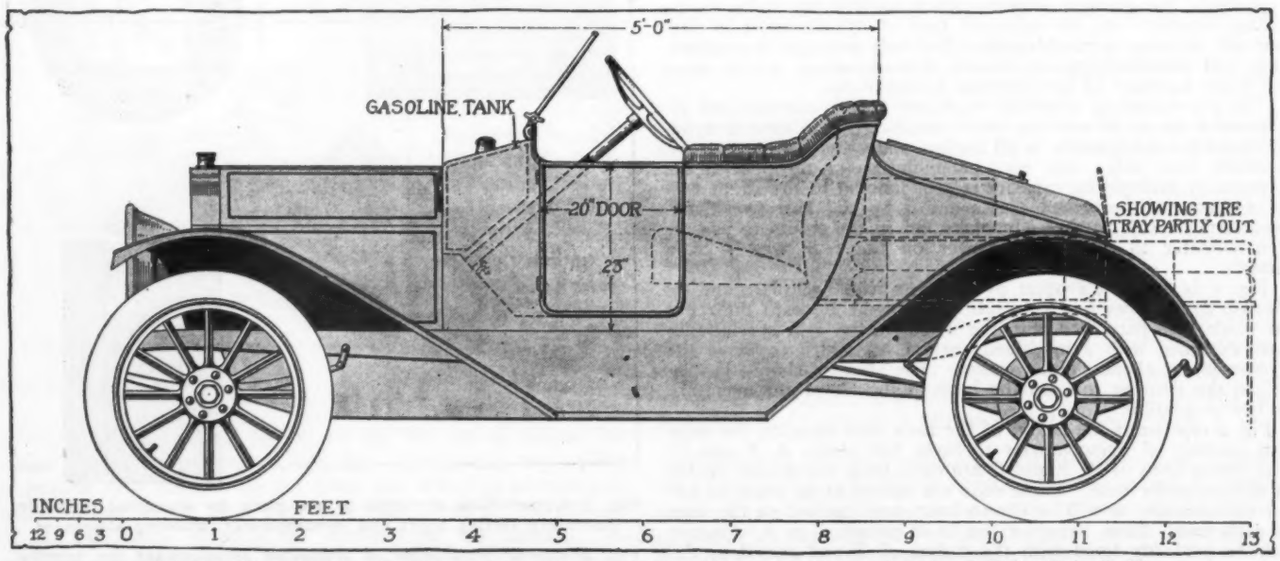
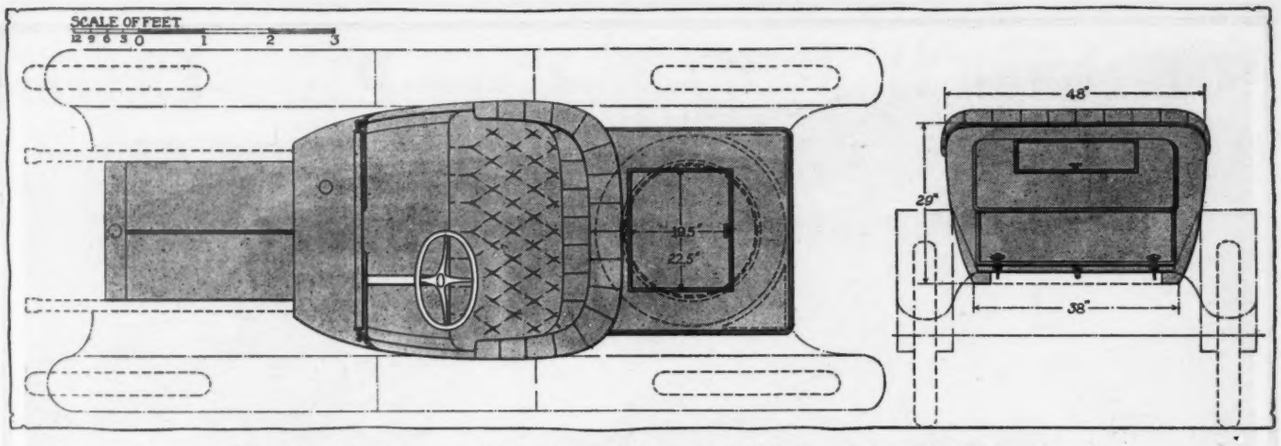


Fig. 2—Side elevation to scale of suggested runabout design adapted to chassis of Paige-Detroit 36



Plan view and rear elevation of suggested runabout body for Paige-Detroit chassis

Above the tire compartment the space is utilized for carrying miscellaneous articles of luggage. This is sufficient for one large or two small suit cases and have room besides. The floor dividing the upper and lower compartments is one sheet of metal and waterproof and there is suitable drainage, so that in case of water leaking into the top compartment it will not be carried into the lower compartment and do damage. An idea of the storage space that this upper compartment provides can be obtained by reference to the side elevation Fig. 2 in which a suit case 18 inches by 8 inches by 30 inches is indicated. The door on top is made watertight.

The body interior has ample seating space for two people. A generous thickness is allowed for in the trimming, and there is a small locker space under the seat. The gasoline tank under the cowl is not directly connected with the metal of the body; air space is allowed all around. The filling plug is directly under the cap on the cowl.

The electric dash lamps are placed flush with the dash and the horn is placed under the hood.

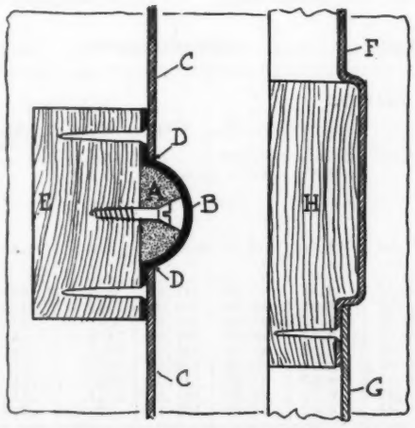
One of the novelties used on this design is the Auster windshield. This shield is of canvas that is unrolled from a spring roller and held in position by the two side arms as shown on Fig. 2. On Fig. 3 the shield is shown folded and the arms are turned down. When in use the angle of the shield can be made at will and as the material is very light it can be folded away very easily. This type of shield has most of the advantages of the glass shield without its greater weight.

The ventilation of the body is by means of the doors entirely, that on the left side being hinged opposite to the right door. By leaving both doors slightly open and as the openings are in opposite direction a cross circulation of air is obtained.

The standard equipment is utilized throughout, including the front and rear fenders. The color specification for this design cannot be improved over that of the stock car. Standard blue and striping and black leather are as good and lasting in results as can be desired. The quality of the material should be of the best for hair, springs and leather if comfort is to be had after the car has seen service.

New Metalklad System of Metal Body Construction

THE increasing use of sheet metal as a material for the panels is one of the most noticeable tendencies in automobile body construction at the present time. Metal lends itself readily to the formation of harmonious curves which enhance the appearance of the car. And the close attention which is being given to this point besides the great favor which the streamline type of body is meeting with are undoubtedly having a stimulating effect on those body builders who heretofore have devoted their energies chiefly to construction in wood. As is well known, the two metals used in body work are steel and aluminum, and the method of joining the separate sheets is a constructional detail that admits of much ingenuity in the design so that the resulting exterior surface is smooth and unbroken.



Figs. 1 and 2—Methods of joining panels in metal body construction

One method of accomplishing this result adopted by an English concern, the Regent Carriage Co., of London, is described in *The Autocar*, London. The system is known as the Metalklad system, in which a strong but light ash framing is covered with steel panels which are pinned and soldered so that they give the appearance of a jointless construction.

The method in which this is effected is shown in the diagrams, Figs. 1 and 2, the former showing how two adjacent panel sheets are joined up on either side of an aluminum moulding A. This moulding is, first of all, secured to one of the wood frame members E, and is then covered with a strip of sheet steel B, which is pinned down by small iron nails. The panel sheets C are then brought up to position and are also closely pinned, the holes being countersunk so that the pin heads are, if anything, below the surface. The two joints D are then carefully soldered and the solder is run over the pin heads, the whole being afterwards cleaned off with sandpaper. It is found that the solder finds its way well in between the panels and the strip B and makes a thoroughly secure joint, which, at the same time, is not apparent as a joint. Fig. 2 shows how, in a similar manner, the upper panel sheet is beaten out and secured.

The method of construction seems admirable and should entirely eliminate the hardening and showing up of joints.

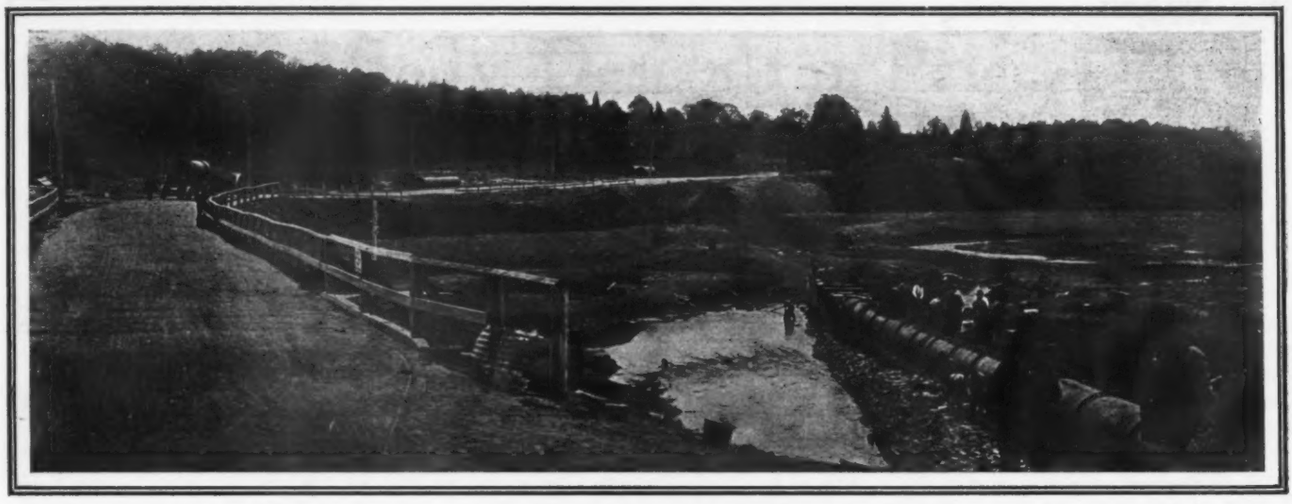


Fig. 1—View of the country where the Easton, Conn., pipe line is being laid, showing truck and some pipes on the road

Trucks Save 86.6 Per Cent. In Heavy Work

In Constructing Pipe Line, Automobiles Transport a Pipe for $2 When By Horse It Costs $15

GIVEN: The problem to build a dam and a drinking-water pipe line over a distance of about 7 miles of hilly territory and containing mostly poor roads; the solution to be reached at the lowest possible cost. This problem means transportation at minimum cost of iron pipes weighing several tons, of thousands of hundredweight bags full of cement, of machinery, power plants, timber, telpherage, coal, etc., aggregating hundreds or thousands of tons. And of these tons, each pound and ounce must be carried over the poor roads, up steep hills, in the shortest possible time. If these facts are kept in mind, the vastness of the problem becomes apparent even to those not familiar with such work.

That motor trucks are capable of considerably assisting the contractor and engineer in such work, needs hardly to be said; but that it was ever possible to do such pieces of work without the help of trucks is a thing to be wondered at. Only concise comparison, however, brings out the marvelous advantage of the commercial motor vehicle.

First a general statement as to the comparative cost: **To build the pipe line of about 7 miles length, approximately 1,300 pipes of 5 feet diameter and roughly 10 yards length are needed. Each of these cast-iron pipes weighs 5 tons, and to transport it over the distance of about 5 miles—if this is taken as the average travel of each pipe, on account of the hilly condition of the territory and to compensate for the hills between the loading point and half way from the end of the line—costs $3 a ton or $15 per pipe, if horses are used for the work. If motor trucks are used, the cost is $2 per pipe or 86.6 per cent. less. The total saving on a line of 1,300 pipes is $16,900.** A similar saving as compared with the cost of horse transportation applies in the case of machinery, building material and so forth.

The Bridgeport Hydraulic Co., of Bridgeport, Conn., is

MAKE....Locomobile..... CAPACITY....5 Tons.... ENTERED SERVICE....April 9, 1912.... TRUCK NO.....2.....

Month 1912	Variable Expenses	FIXED CHARGES					Total	Miles	Cost per Mile	Tons	COST PER		NUMBER OF		Remarks
		Garage	Driver	Interest	Insurance	Depreciation					Ton	Ton Mile	Trips	Days	
To 22nd, 1913															
January	$38.44	$10.64	$57.00	$7.04	$5.76	$62.40	$181.24	376.	$.48	332.	$.546	$.188	16	13	.....
February	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	.....	....	....	.....
March	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	.....	....	....	.....
April	70.99	10.00	57.00	6.87	5.60	60.69	211.15	606.7	.348	245.2	.861	.145	52	19	.....
May	91.00	15.00	82.00	9.92	8.12	88.00	294.04	1135.8	.259	340.4	.864	.106	70	23	$1 Bonus
June	42.65	15.00	76.00	9.92	8.12	88.00	239.69	1095.7	.218	344.5	.695	.091	73	24	1 Bonus
July	57.84	15.00	89.00	9.92	8.12	88.00	267.88	1438.8	.186	473.	.564	.078	96	26	8 Bonus
August	118.94	15.00	91.00	9.92	8.12	88.00	330.98	1348.	.245	459.	.719	.098	91	24	10 Bonus
September	200.34	15.00	97.00	9.92	8.12	88.00	418.38	1667.	.251	582.4	.719	.098	114	25	19 Bonus
October	304.03	15.00	101.00	9.92	8.12	88.00	525.07	1541.	.341	524.4	.101	.134	102	29	11 Bonus
November	241.32	15.00	92.00	9.92	8.12	88.00	454.36	1342.	.338	464.5	.975	.132	91	23	11 Bonus
December	81.15	15.00	83.00	9.92	8.12	88.00	275.19	920.	.299	326.	.855	.121	66	21	2 Bonus
Total per annum	1236.70	140.64	825.00	93.27	76.32	827.09	3198.02	11471.	.....	4091.4	.779	.....	771	227	$63.00
Average per month	123.67	14.06	82.50	9.32	7.63	82.70	319.80	1147.1	.....	409.1	....	.....	77.1	22.7	.....
Average per day	5.44	.....	3.60	.....	.....	.....	14.00	50.5	.....	18.	....	.....	3.4	....	.....
Average per mile	.107	.....	.....	.....	.....	.....	.278	.....	.278	....	....	.....	....	....	.....
Average per ton mile	.....	.....	.....	.....	.....	.....	.106	.....	.....	....	....	.....	....	....	.....

REMARKS:

Investment.....$4764.00
Interest, Average at 5%
Insurance, Fire..... $57.50
Liability..... 40.00
$97.50

Depreciation on $4764.00 less tires ($540.00) at 25% per annum.

Average tons per trip..... 5.3
Miles per round trip.....15.2

Fig. 2—Truck and trailer loaded ready for the way. Observe the hoisting mechanism on the platform of the truck

carrying out the work referred to in the opening lines, using for this purpose freight automobiles. Two of these are Locomobiles, of the 5-ton type, capable of carrying that and also of hauling an equal load resting on a trailer connected to the truck proper. Fig. 1 shows one of these trucks traveling along the road, and Fig. 2 shows it loaded and connected with a loaded trailer, ready for work. The trucks used for this work are built with a transmission permitting of using the motor power for work other than propelling the truck, and Fig. 2 illustrates the machinery which permits of applying it to the loading and unloading of the truck with the 5-ton pipes. This device consists of a pair of drums or capstans mounted on a horizontal shaft at the left side of the truck platform and driven by shafting from the working shaft of the special gearset. The operation of the drums is regulated by a lever mounted just behind the speed-change lever. In front and behind each of the front and rear drums, respectively, a cross-bar is mounted on the truck, being secured to the body platform and being fitted with a pair of blocks forming a seat, shaped to accommodate the curvature of the pipe.

Fig. 4 shows the method of leading, the pipe being drawn up over the power-operated capstan drums by means of two strong ropes. In unloading, the ropes are slackened around

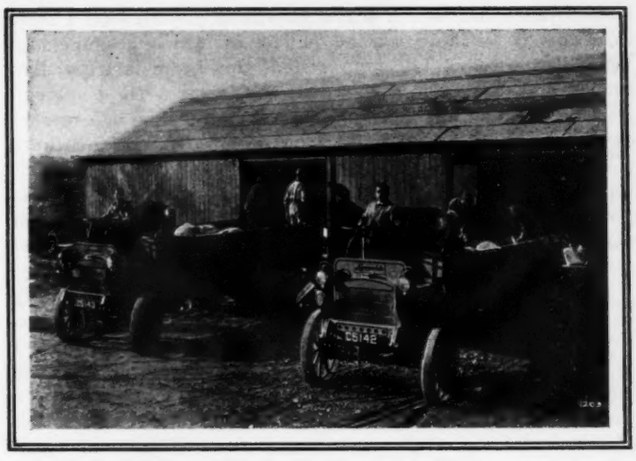


Fig. 3—Trucks backing against a platform for loading

the drums, so that the pipe is sunk by its own weight. Two blocks of wood and a pair of pressed-steel channels form the runway for the pipe. To take the weight of the pipe off the truck springs when the pipe is positioned on one side of the

MAKE....Locomobile..... CAPACITY....5 Tons.... ENTERED SERVICE....April 13, 1912.... TRUCK NO.....3.....

Month 1912	Variable Expenses	FIXED CHARGES					Total	Miles	Cost per Mile	Tons	COST PER		NUMBER OF		Remarks
		Garage	Driver	Interest	Insurance	Depreciation					Ton	Ton Mile	Trips	Days	
January	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	.....	....	....	.....
February	.....	.....	.....	.....	.....	....	.....	.....	.....	....	....	.....	....	....	.....
March	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	.....	....	....	.....
April, 17 days	$56.53	$7.50	$45.00	$5.56	$4.54	$49.13	$168.26	535.	$.314	185.5	$.907	$.133	39	15	.....
May	83.06	15.00	81.00	9.92	8.12	88.00	285.10	1037.	.275	362.	.788	.109	73	23	.....
June	65.24	15.00	75.00	9.92	8.12	88.00	261.28	1151.	.227	380.	.686	.091	76	25	.....
July	70.86	15.00	90.00	9.92	8.12	88.00	281.90	1495.6	.188	496.	.566	.076	101	26	.....
August	62.97	15.00	88.00	9.92	8.12	88.00	272.01	1466.	.185	490.	.555	.074	97	24	.....
September	218.91	15.00	94.00	9.92	8.12	88.00	433.95	1624.	.260	561.7	.775	.104	110	25	.....
October	228.74	15.00	101.00	9.92	8.12	88.00	363.66	1548.	.234	515.1	.686	.093	102	29	.....
November	69.59	15.00	92.00	9.92	8.12	88.00	282.63	1520.	.186	526.	.537	.073	103	25	.....
December, 3 days	12.14	1.50	6.00	.99	.81	8.80	30.24	48.	.630	15.4	.196	.246	3	2	.....
8 mo. Total per annum	$868.04	$114.00	$672.00	$75.99	$62.19	$673.93	$2379.03	10424.6	.....	3531.7	....	.....	704	194	.....
Average per month	108.50	14.25	84.00	9.49	7.77	84.24	297.38	1303.1	.....	441.4	$.673	.....	88	23	.....
Average per day	4.47	.587	3.46	.392	.320	3.47	12.26	53.73	.....	18.20	....	.....	3.58	....	.....
Average per mile	.083	.....	.....	.....	.....	.064	.228	.....	$.228	....	....	.....	....	....	.....
Average per ton mile	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	$.091	....	....	.....

REMARKS:

Investment.....$4764.00
Interest, Average at 5%
Insurance, Fire..... $57.50
Liability..... 40.00
$97.50

Depreciation on $4764.00 less tires ($540.00) at 25% per annum.

Average tons per trip.....5.01
Miles per round trip.....14.7

Fig. 4—Unloading the Locomobile pipe truck

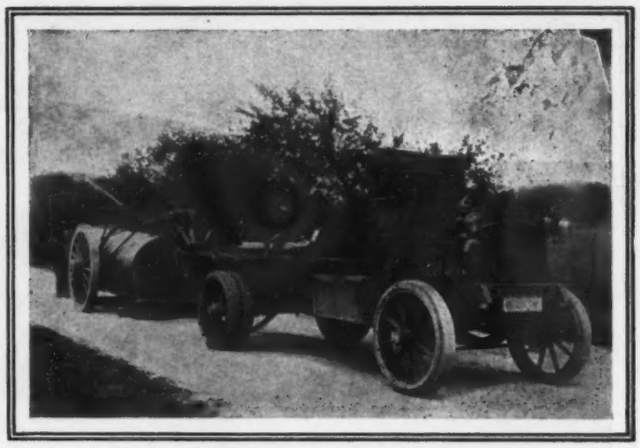


Fig. 5—Unloading the trailer of the truck

chassis, a pair of jacks mounted under the frame on this side are used. The jacks proper are secured to tree stumps.

The trailer consists of a pair of wheels mounted on a steel axle curved overhead, to the middle of which a crane-neck beam is secured. The long end of this beam is trussed to the axle at four places so as to constitute a rigid system. At the short end of the beam, just above the axle, is a ratchet device with two pawls and a long lever. By working these a chain laid around the pipe is either wound around or off the ratchet wheel, thereby raising or lowering the pipe. One man controls the pawls, keeping one in and the other out of engagement with the ratchet, while two men control the end of the lever bar to which a cable is fastened.

All pipes are loaded at a dock where they are brought by a steamer. They are discharged along the roadside. Machinery and other loads are also loaded either by motor power or by means of cranes. Cement and similar material is placed on the truck in bags, being put on and off while the truck runs up against a platform which is on one level with that of the truck body, as shown in Fig. 3.

Provided each truck is used in conjunction with a trailer, it can transport seven pipes per average day, making three trips and loading for another on the next day, and making four trips on that day. As the total daily average operation cost of one of the trucks is $12.26 and that of the other $14, the latter figure may be safely taken as an average daily cost, and figuring fourteen pipes in 2 days at the cost of $28, or $2 a pipe, as stated above.

The tabulations at the bottom of this and the next page show the various expenses of both Locomobile trucks, each for the first 9 months after installation. During this time the total cost of operation and maintenance for trucks No. 2 and 3 were $3,198.02 and $2,379.03, respectively. The average cost per ton carried was 77.9 cents and 67.3 cents respectively. The various average figures appearing in this tabulation will probably be of interest to users of trucks. The tabulation showing the cost of truck No. 2 gives, under the heading remarks bonuses, premiums pair to drivers for extra trips made; a driver being paid $1.00 for each trip made in addition over the seven prescribed for 2 days.

On the bottom of page 22 some figures are given which give an idea of the time spent in loading, carrying and unloading the pipes on the job here illustrated. On May 21, the truck traveled 5.6 miles in 35 minutes, at 9.6 miles an hour. Having arrived at the point of unloading, the skids, etc., were gotten ready for unloading, the pipes were unloaded and the truck was made ready to leave, starting away from the place of unloading 9 minutes after having arrived there. It traveled to West End, 4.6 miles distant, at a speed of 9.2 miles an hour. In the afternoon, the truck arrived at the dock at 1:25 and during the next 39 minutes was loaded with a pipe and coupled to a trailer loaded likewise. It took 1 hour, 8 minutes for the truck and trailer to arrive at the point of unloading, where the teams spent 38 minutes in unloading the two pipes before starting back.

On the following day the truck upon arrival at the dock was loaded with a pipe and connected to trailer, all of which took 16.5 minutes. After losing 10 minutes on the road, the entire journey took 24 minutes, while unloading took 34 minutes, after which the truck started on its way back.

The men busy in loading and unloading were: One at each drum, the driver to operate the power and place the truck and the trailer and one man to guide the ropes and to superintend the whole work.

Records of Time Spent by 5-Ton Locomobile Truck Used in Building the Easton Line

Truck Without Trailer

May 21	Minutes
From dock to unloading point, 5.6 miles	35
Preparation to lower pipe	3.5
Lowering the pipe	1.5
Getting skids and jacks on truck, etc.	4
Get ready to leave the place	.5
Travel to West End (North avenue, 4.6 miles)	30.5

Truck and Trailer

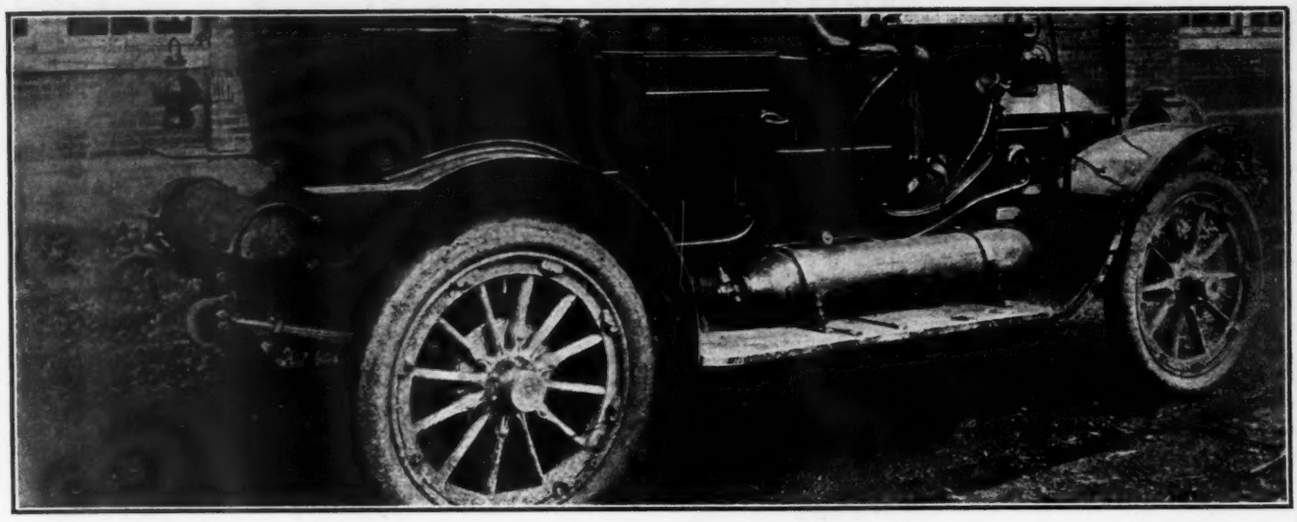
Afternoon: Preparing truck for loading at dock	7
Hoist pipe on to truck	3
Remove skids, jacks, etc., fastening ropes	2
Backing up to trailer and coupling it on	3
Time lost in waiting for coats, etc.	24
Travel to unloading point, 5.6 miles	68
Preparations for unloading	7
Lowering the pipe carried on truck	1.5
Getting skids and rope on truck, etc.	4
Lost time in inspecting a bridge over which a pipe will have to be transported on May 22*	7
Preparing to unload trailer	1.5
Unloading the trailer from its pipe	2
Pulling the trailer away from the pipe	5
Rolling the two pipes across the road	8.5
Preparing to leave the place	1.5
Travel back to dock, 5.6 miles	45

Truck and Trailer

May 22	Minutes
Preparing to load the truck	3
Load the pipe on to truck	4
Getting skids and jack on truck, etc.	2
Backing up to trailer and coupling it on	4
Traveling to unloading point, 5.6 miles, including loss of 10 minutes on the road†	84
Preparing to unload the truck	7
Lowering the pipe carried on truck	3
Getting skids and rope on truck, etc.	3
Lost time in getting out of a wagon's way	2
Pulling up the trailer before unloading it	.5
Unloading the trailer of its pipe	5
Pulling the trailer away from the pipe	1.5
Rolling the two pipes out of the way	7
Preparing to leave the place	3.5
Travel to dock, 5.6 miles	28

*As the pipes were unloaded near a feeble-looking wooden bridge, the driver thought it opportune to inspect the latter's strength. The time thus lost proved a good investment: the bridge would have been unable to support the truck and its load.

†In passing some of the pipe-line construction work, a rope was encountered, taut across the road, and the truck had to wait until the workers were ready to slacken it.



Packard car, showing mounting of the compression tanks containing the liquefied natural gas which is used as fuel

Automobile Run on Liquefied Natural Gas

Ford Car Runs 100 Miles on 300 Cubic Feet at a Cost of 1.5 Cents

CHICAGO, ILL, May 21.—To run motor cars on gas carried under pressure on the running board or some other accessible location instead of using gasoline is the prospect offered by a new process of liquefying natural gas. The economy of natural gas as a fuel for gasoline engines long has been recognized; in fact, this is the fuel employed for testing purposes in some of the motor car factories in Detroit. The difficulty has been in utilizing the gas in a power plant that is not stationary.

A system of compressing natural gas to a liquid and storing it in this form in tanks resembling those used for lighting acetylene lamps has recently been developed by Albert M. Schenk, president of the Packer's Motor Truck Co., Wheeling, W. Va. By his process, the natural gas as it comes from the wells is liquefied and stored under a pressure of 50 pounds per square inch in steel tanks. It is found that this liquefaction removes most of the impurities from the gas so that it emerges from the tank practically a pure fuel.

In application, the tank is simply connected with small expansion chamber to the ordinary carbureter and the fuel admitted to the engine and used in precisely the same way as gasoline is used. Several cars have been fitted with the tanks, among them, two trucks, one Packard touring car and a Ford.

At present the cost of liquefaction and storing is 5 cents per thousand cubic feet of free gas, and it is stated that in tests on the speedway at Indianapolis, Ind., the Ford car ran 100 miles on less than 300 cubic feet. Each tank as now arranged holds about 600 cubic feet of free gas at a pressure of 50 pounds, but it is expected to double the pressure and the mileage per tank under improved methods of manufacture.

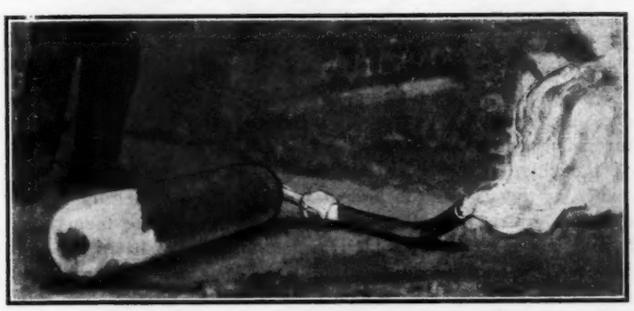
In general, the expectation of the backers of the new process is to sell the liquefied gas at a price that will make the cost per mile one-half that of gasoline. It is expected to establish refilling stations throughout the country so that empty tanks may be exchanged for full ones in much the same way that lighting tanks are exchanged.

At the present time the regular carbureters are used, but experiments are under way toward dispensing with the carbureter. One of the claims made for the fuel is that it is clean, leaving no deposit and no smoke. Patents for the process have been granted and others are in the patent office for which reason no details of the process of manufacture can be given at this time.

Why Benzol is a Good Fuel

LONDON, ENGLAND, May 31—At a recent dinner given by Lord Montague, editor of *The Car*, Henry L. Doherty, of New York City, made the statement that no less than 12,000,000 gallons of benzol could be recovered annually from the city gas works of London alone by probably handling the gas. Experts in the gas business in New York claim that an adequate substitute for gasoline as an automobile fuel cannot be developed from this source in the United States. It has been pointed out that the introduction of benzol as an automobile fuel has made but little progress thus far, although present indications point to an increasing activity in the popularization of this substitute for gasoline.

Some reports from car owners who have tried benzol in their machines indicate that the refined benzol is superior to gasoline. The motor starts more readily on both the refined and crude benzol and seems to be much more resilient and to give more power than with gasoline. The refined, or water white, benzol is stated to be an excellent fuel for internal combustion engines, but the crude is not as good because it gums up the inlet valves and manifold. The crude material carries some matter in suspension and some in solution, say several cars owners who have given the subject intelligent attention, and this matter precipitates the moment the clear benzol is gasified or vaporized and some of it collects in the intake end.



The new fuel for automobiles, liquefied natural gas, burns freely in the air without danger of explosion

The Rostrum

In which Letters from Readers Are Answered and Discussed

Owners Discuss Location of Gearbox

Coil Not Apt To Go Wrong—Wiring of Michigan Ignition—Pulverized Coal Recommended as a Cheap Fuel—Motor Chokes When Running at Low Speed

EDITOR THE AUTOMOBILE:—I have been reading with considerable interest, the articles about the proper location of the transmission. This is well enough for the engineers to discuss, but they deal with the problem of new cars. Why not invite some of the users to express their opinions? I believe the only test is after the car has been in use a year or two, and the man who has used all of the different kinds is best qualified to speak. I happened to have two cars with each kind of arrangement, and find the rear axle idea altogether wrong. In the first place they are hard to get at for repairs, oiling and adjustment. In the second place, owing to shocks sustained, they give trouble, after 5,000 miles, and will continue to do so. I find that arrangement is hard on tires too. My experience teaches me that for a heavy car, say 3,000 pounds or over, the amidship location is much to be preferred. For light cars, the unit with the motor does very well. The unit with rear axle has proved a complete failure on both of my cars, one of which was heavy, and the other fairly light.

Mina, So. Dak. C. E. BASHL.

—Do you agree with Mr. Bashl? Car owners who have views upon this subject are invited to express them in these columns. Under the head of the Engineers' Forum, engineers are thoroughly threshing this matter out, now it remains for the car owner to speak his preference.

¶ *In answering this question car owners are directed to the fact that one of the leading arguments advanced against rear axle location is that of increased axle weight and consequent tire damage. Definite information on this line would be in order.*

¶ *Those not in favor of the amidship location have urged against it lack of accessibility.*

¶ *The gearbox as a unit with the motor has been criticised in that it is not suitable for a heavyweight car because of the fact that too much weight is placed in front.*

Coil Does Not Require Much Care

EDITOR THE AUTOMOBILE:—I have had considerable trouble with the ignition on my car this spring which was finally traced by a repair man to a defective coil. The motor would run on battery but would not run on magneto. The system in use is a Splitdorf model N magneto and model N coil. I have sent for a new coil. Can you suggest what may have caused the coil to give out, so that I may avoid trouble as far as possible in the future? The motor does not start as readily as the average and I would like to inquire if it will do any harm to use six or eight cells for starting, instead of the usual battery of four as at present installed? I have used four different sets, but they all required too much cranking, even in warm weather. The wiring from the battery runs through the coil box. While running on the battery, since the failure of the magneto, turning on too much gasoline, or advancing spark too far, seems to cause motor to skip or misfire.

Farmington, Conn. G. E. M.

—Trouble will not develop in a coil very often and it is only occasionally that a defective one slips through the manufacturers' inspection departments and starts to cause trouble. One of the chief causes of coil trouble, and the fault of the car owner, is the use of too high a voltage. This generally causes a pitting of the vibrator points and tends to make them burn away rapidly. The use of four cells would never harm the coil. It would be better to use five cells as long as you are having trouble in starting and thus secure a hotter spark. Six cells are the limit in number, however. Each cell develops about 1 1-4 volts when new but this drops to a volt after they have been in use for some time.

Michigan Ignition on Regal Cars

Editor THE AUTOMOBILE:—We have a 1911 Regal 30 equipped with Michigan magneto and non-vibrating coil under hood with battery for starting. We bought the car which appeared to be in good shape, had no occasion to use it for several days and then it would not start on either magneto or battery and we could not get a spark from either. We took coil and magneto off and showed them to the K. C. Battery people. They told us the magneto was all right but the coil was wrong, and they worked on it. Since getting it back we have been unable to get the engine to run on magneto and only rather poorly on battery. It sounds much like the trouble we had with a Splitdorf coil as published in THE AUTOMOBILE recently. Howevere, the wiring is more complicated when under the hood as in this case. Kindly show a wiring diagram of this.

2—The Moline engine is given 4.125 bore and 6-inch stroke, rated 40 horsepower. The Henderson a bore of 4.12 stroke by 5.5 stroke claimed to have actually 44 horsepower. Where does it come in?

3—Is it an advantage or a disadvantage to have clutch and brake connected?

Bosworth, Mo. BOSWORTH GARAGE.

—1—The trouble with the ignition system is probably in the coil rather than in wiring. The wiring diagram is published herewith, Fig. 1, however, in case you may need it for your guidance. In a case of this kind it is not wise to attempt the repair of the coil yourself, either from a standpoint of securing better work or for economy. The coil should be sent to the maker who will give you the best service at the lowest rate.

2—Both of these motors will readily develop the power at

which they are rated when new. The maker's rating is not of any particular value in most instances and is merely used as a method of naming the model. The makers very often will change the apparent rating of a model in putting the same motor in a different chassis. For instance, a car which is called a 40 this season may next be known as a 44 while all the essential features of the motor are the same.

3—This is a matter of personal choice. The advantage of having the clutch and brake operated from the same pedal is that one pedal is eliminated. It is not necessary to remove the foot from the pedal in stopping the car by simply pressing on the pedal and there is no chance to stall the motor by accidentally applying the brake with the clutch engaged. The disadvantages are that it is sometimes difficult to tell when the clutch is just disengaged before the brake is on. It is quicker to press the two pedals at the same time than to press the single pedal through double the distance. It is sometimes necessary in severe work to use the brakes as well as the motor for a brake. This could not be done with the single pedal.

Perhaps you refer to the practice which is followed by many manufacturers of connecting the emergency brake lever with the clutch so that when the emergency brake is applied the clutch is thrown out of engagement at the same time. This is largely a matter of personal preference, most car owners having cars equipped with this arrangement being highly satisfied with it while others do not like it. One of the chief objections to it is that it prevents the use of the motor as a brake when the emergency brake is being used and vice versa. It has the pronounced advantage of adding to the safety factor for the car cannot be started when the emergency brake is on.

Pulverized Coal as a Cheap Fuel

Editor THE AUTOMOBILE:—I have been much interested in the attempts to solve the problem of high-priced fuels. It seems to me that there are yet vast possibilities in the use of coal, especially powdered coal.

I have just re-read with considerable interest the article entitled, "Pulverized Coal a New Fuel," by Prof. William D. Ennis, which appeared in THE AUTOMOBILE for October 12, 1911.

I should like to ask the following questions which the article by Professor Ennis has brought to my mind:

1—Can any kind of hard or soft coal be used when powdered? If not, why not?

2—What is meant by 60 or 80 mesh?

3—The tube mill is mentioned as one of the types which are used to pulverize the coal. How is it constructed?

4—The following statement is made: "A highly volatile soft coal must be employed." Why? Laying aside the difference in cost, why cannot hard coal be used? Are there any pamphlets or books devoted to this subject? Where can I get information concerning types of grinding mills, methods of feeding the powdered coal, etc.?

5—In THE AUTOMOBILE, issue of May 1, 1913, there appears an article entitled, "Flameless Combustion and Automobiles of the Future." Chamot is mentioned as a granular fireproof material. What is it?

6—When using the liquid fuel in this system, is the air preheated or does it go to the burner at atmospheric temperature?

South Auburn, Ind. G. W. R.

—1—Only the soft coals can be used, because they contain the necessary percentage of volatile matter. Experiments have been made with the harder coals, but they have simply burned up in the furnace without producing the necessary gas. Only the softest grades of bituminous coal are satisfactory, because they contain the volatile matter necessary.

2—The mesh refers to the size of the screen through which the coal is sifted, and 60 and 80 are merely specific sizes.

3—The tube mill consists of a large cylinder about 8 feet in diameter and 20 feet long. In this cylinder there are thirty or forty pieces of iron pipe running the full length of the big cylinder. When the big cylinder is rotated rapidly the coal works its way between the pipes contained therein and is broken to pieces.

4—A highly volatile fuel must be employed in order that the gas be given off. Hard coal does not contain these gases. The only books extant on these subjects are in the form of transactions of the Brooklyn Engineers' Club of 4 years ago and some articles on the subject by Professor Ennis which were published in the *Engineering Magazine* about 6 years ago.

5—Chamot is a mixture of fireclay and burnt clay. This is the trade name given this particular combination of materials and its particular property is the fact that it is of exceedingly high fire test and hence valuable in the construction of crucibles, etc.

6—Either method can be used. Preheating the air results in a gain of efficiency.

Voltage at the Spark Gap

Editor THE AUTOMOBILE:—Could you tell me to what voltage the ordinary low-tension coil steps up the current, the current supply being six ordinary dry cells or Edison wet cells? The coil I refer to is the type ordinarily used with make-and-break ignition. Also, would it be practical to start engines with make-and-break ignition from a storage battery of 28 volts, fourteen cells, 40 ampere hours, without the use of a low-tension coil? Is this voltage too low? Would it injure the battery if used without a coil? Engines are six-cylinder, 6 by 8, running at 350 revolutions per minute, and are equipped with magnetos for running. The battery is used only for starting. This battery is installed for lighting but is seldom used and I thought I could save the cost of battery renewals for the engine if I used the storage battery without the coil if the voltage was high enough which I do not think it is. Of course I want to use all of the battery of fourteen cells or none of it, not taking three cells and using the coil, because this would be using the battery unevenly.

Scarsdale, N. Y. E. HUGHES.

—The ordinary primary coil used with the make-and-break system of ignition will give a voltage at the sparking point of between 2,000 and 3,000 when used in conjunction with a 6-volt battery circuit. There are really two sparks at the points of such a system when considered carefully, one due to the breaking of the primary circuit by the separation of the points and the other is the induced current which passes through the windings when the primary circuit is broken. The separation of the points connected in the primary circuit really draws an electric arc and would in itself cause a small, weak spark to occur. When the current of the battery is broken, however, the phenome-

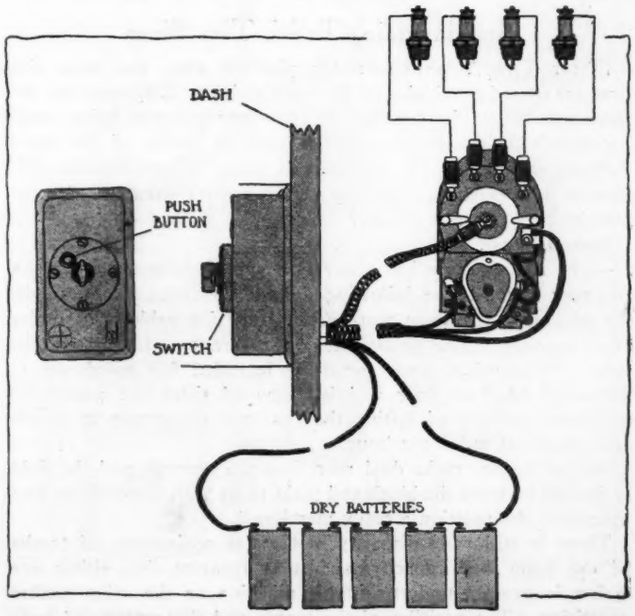


Fig. 1—Wiring diagram of Michigan ignition as used on the Regal

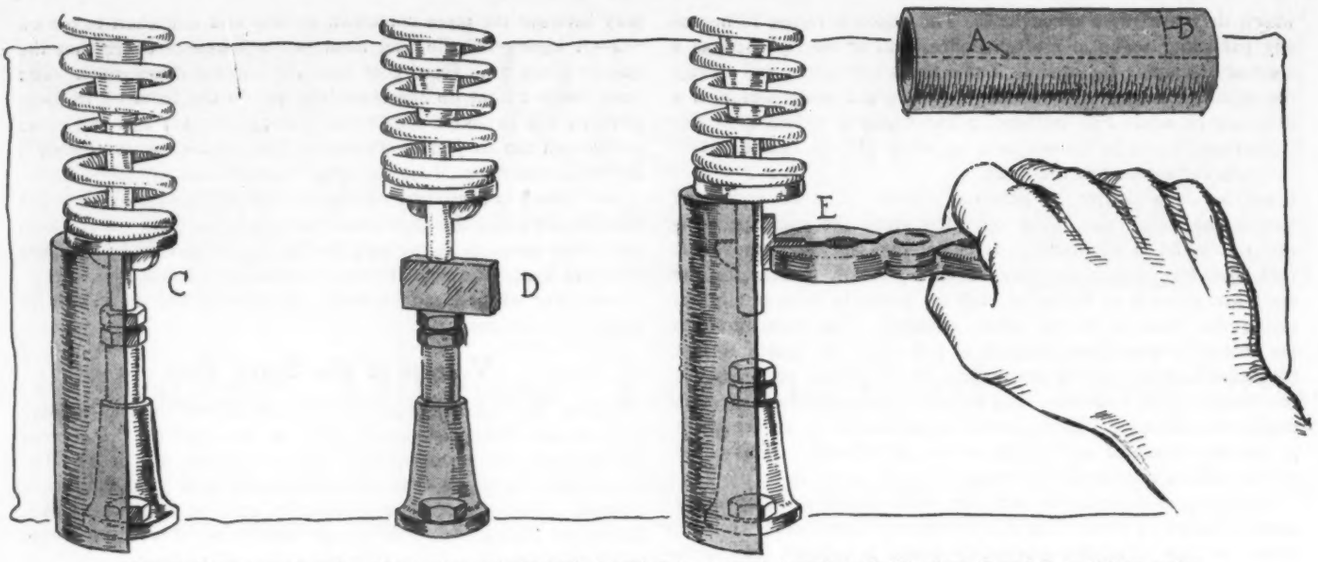


Fig. 2—Home-made valve lifter, pipe cut through A and B to correct length to fulfill steps C and D in lifting valve

non of electric induction occurs. A current of low amperage but of exceedingly high voltage, flowing in the opposite direction, causes the spark to be given the tension necessary to make it hot enough for ignition purposes.

It would not be practical to use your storage battery for the make-and-break ignition without a coil. In the first place, the current is not high enough in voltage to give a sufficiently hot spark and in the second place, to short-circuit the battery at each making of contact would soon put it out of commission altogether.

Another reason why it would not be good practice to use the battery without any coil would be the fact that the points on the coil would soon burn out. The trembler on the coil is designed for the low voltage and if a voltage four times as large were used the trembler points would not stand it even though frequently adjusted.

It would be a perfectly reasonable arrangement to connect the cells of your battery as follows: Take three out for ignition in connection with the coil. The remaining four could be used for lighting on a six-volt lighting circuit. It would be wise for you to connect one of the lighting cells in parallel so that you would not get an excess voltage at the lamps.

Standardizing Truck Tire Sizes

Editor THE AUTOMOBILE:—On pleasure cars, the same size tires are used for vehicles of the same weight. Why does not the same rule follow for trucks? Is there any progress being made for standardizing the tires to be used on trucks of the same carrying capacities? I believe that there is considerable difference now existing, especially in the heavier varieties of commercial cars. Is this not so?

Boston, Mass. DELIVERY.

—The tire question has progressed considerably the last year, and now seems to be following definite courses. For example, the pneumatic tire is in more general use for vehicles of under 1-ton capacity. The single pneumatics front and rear are the rule. These vehicles are generally intended for speeds of 15 miles per hour or over and in some of them the pneumatic equipment permits of setting the governor to operate at speeds from 20 to 25 miles per hour.

On the larger trucks dual rear tires are general, and the field is divided between the block and plain types with the cushion type occupying the position already mentioned.

There is still wide disparity in the tire equipments of trucks of the same load capacity, and it is apparent that either one maker is grossly undertiring his machine or the other maker overtiring. The position of the motor and the amount of body overhang back of the rear axle are factors which determine tire equipment, but when these are taken into consideration there still remains much variation. The following tabulation shows some examples:

Example	Motor location	Front tires	Rear tires
		One-Ton Vehicle.	
1	Hood	34 by 4½	36 by 3½
2	Hood	35 by 4½	35 by 4½
3	Hood	35 by 5	35 by 5
		Two-Ton Vehicles	
1	Hood	36 by 3½	34 by 4 dual
2	Hood	36 by 4	36 by 4 dual
3	Hood	36 by 4	36 by 3½ dual
4	Hood	36 by 4	36 by 3½ dual
5	Hood	34 by 4	36 by 3½ dual
6	Hood	34 by 3½	35 by 4 dual
		Three-Ton Vehicles	
1	Hood	36 by 5	42 by 5 single
2	Hood	38 by 5	42 by 5 dual
3	Hood	36 by 4	35 by 4 dual
4	Hood	36 by 5	40 by 5 dual
		Five-Ton Vehicles	
1	Hood	36 by 5	37 by 5 dual
2	Hood	36 by 6	36 by 5 dual
3	Hood	36 by 5	42 by 6 dual
4	Hood	36 by 5	40 by 6 dual
5	Hood	36 by 6	42 by 5 dual

Motor Chokes Up at Low Speed

Editor THE AUTOMOBILE:—I wish you could help me out of my trouble which is as follows: I have a late model 1911 Ford open roadster which I bought new 2 years ago and which I have given very great care and the best of oils, etc. I have run it only about 2,650 miles and for the past 3 weeks it has been coughing and jerking which is really caused by a missing of one or more of the four cylinders but I cannot tell which one, as the plugs are all right, being new and clean. Have put in new wiring, taken off the cylinder head, and cleaned out the carbon deposits, readjusted and filed the points on the master vibrator which I am using instead of the vibrators of the regular coil. Have even tried out a different vibrator and also a different carbureter, a Holly. I am using a Kingston floating or ball valve auxiliary air type, but there is no difference in either case on the magneto or on the batteries with either vibrator or coil. The occasional coughing or slow speed continues. Sometimes after adjusting the vibrator points or the needle valve to a different adjustment, the engine will run fine for a short time, and after congratulating ourselves, it begins to cough again, occasionally almost stopping. It sounds as though it did not receive the current and was taking in all air, as you can hear the loud rushing of air through the air intake hole of the carbureter.

Have had the Ford agents here to do the rewiring, adjusting and testing, etc., and it has them guessing so much that they are now trying to tell me that many of the Fords will not run

idle or less than 8 miles an hour without occasional missing, but I know that my engine did, and as I am not fond of racing, it annoys me greatly, besides attracting more or less attention, which I do not like. Hope that you can suggest something that will lead to a remedy.

Portage, Wis. L. E. GRANT.

—When an engine misses at low speed, suspicion is always directed to the valves. Since you do not mention that you have had the valves ground lately or at all since you have had the car, the trouble will probably be found there. A car, when new, very often exhibits slight signs of valve trouble after it has traveled its first 500 miles. The new seat placed upon the valves does not endure in a great many instances nearly as long as that taken by the valve after its next grinding. It is reasonably sure to assert that if you have the valves ground in, provided you have not done so, the result will be a tight motor that will fire at as low a speed as it is possible to secure good carburetion.

Should you desire to grind in the valves yourself, a few directions as to how to proceed may be of assistance. The first difficulty you will have will be to remove the key beneath the lower valve spring pad. This is generally done with a regular valve lifting tool but the following home-made apparatus works very simply and can be made in a few minutes with the aid of a hacksaw and a piece of pipe.

In Fig. 2 an explanation of the method of procedure in arranging the lifter is given. The motor is turned over slowly by means of the flywheel until the valve is lifted to its highest point. The motor is allowed to rest in this position and the distance from the base of the tappet guide to the lower part of the spring seat is measured. In turning over the motor the petcocks should be open so that there will be no difficulty in this respect. A piece of pipe is then cut down through the middle along the dotted lines shown in Fig. 2 and slipped beneath the spring seat to hold it in its compressed condition. The motor is then turned over again and the valve will follow the tappet through its own weight instead of through the spring action as the spring will be held away from the valve. When the tappet has gone as far down as it will, the space between the tappet and the bottom of the valve stem is filled by a block of metal or other hard substance. A nut filed down to the right thickness will often serve the purpose very well.

Lift Will Be Doubled

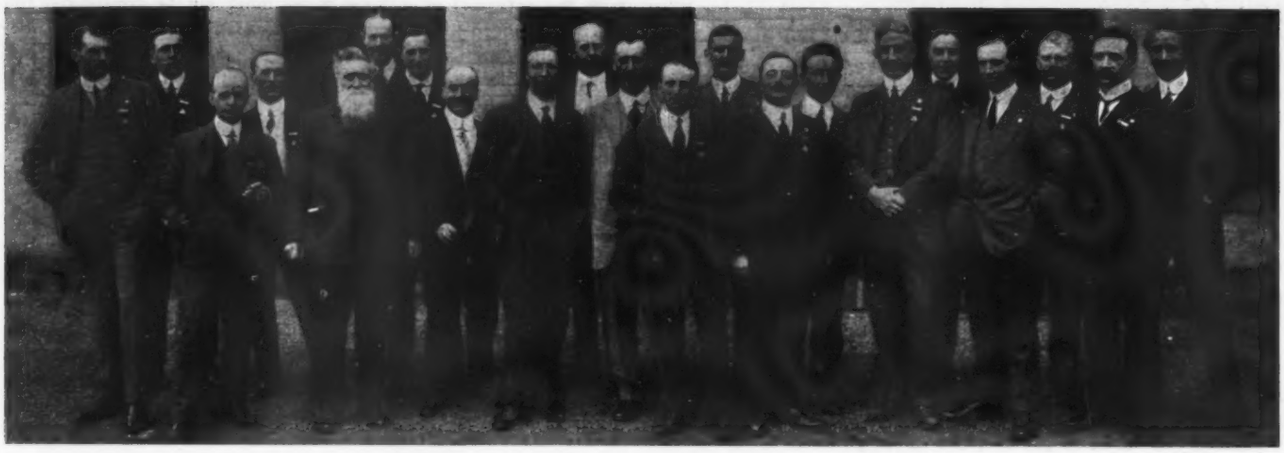
When this is in place the motor is again turned over until the valve is once more in its highest position. This will be double the lift that occurred before on account of the addition of the block of metal to the length of the valve stem. The spring will be lifted off the improvised pipe seating and another and longer piece of pipe inserted as shown in the illustration. The motor is then turned over again and the tappet allowed to come to its lowest position. The valve is allowed to drop down and the key can be withdrawn. This will permit of the spring being removed and will leave the valve free for grinding.

Good valve-grinding compounds can be purchased in any of the automobile supply houses. It is better to buy a prepared grinding compound because if you rely simply on purchasing emery the grade that you are given is apt to be irregular and the valve seating could be spoiled quickly. Before putting the valve-grinding compound on the seat of the valve, stuff a piece of waste into the cylinder port so that there will be no possibility of the compound working its way down into the cylinder. This would ruin the cylinder in a very short time.

A thin layer of the compound is spread on the valve seat and the valve brought lightly and squarely down upon it. There are two methods by which the valves can be ground by hand, Fig. 3, one with a brace and bit and the other by means of a regular screwdriver. The brace and bit is the quicker and at the same time the more dangerous because of the tendency to put too much pressure on the valve. If carefully handled with a light pressure it will serve very well. The screwdriver is slow but at the same time is safer for the inexperienced. It is true that with the screwdriver a lame wrist must not be considered too much of a hardship in exchange for a smooth-running car, because unless the muscles of the wrist are accustomed to hard work they are almost sure to feel the effects of the job for a couple of days.

The method of procedure with both instruments is practically the same except, of course, for the method of handling the tools. The valve is revolved about half way and back. This is done about ten times and then the valve is lifted off the seat and turned to a different position and the same operation again gone through. It is easy to see what this will do to an unaccustomed wrist using the screwdriver as it takes about 40 minutes to seat a valve. The valve is taken out and examined and when a polished appearing seat begins to appear, the grinding compound is removed and the finish given to the seat with ground glass. A final test as to the tightness of the valve is to place it in its seat and pour gasoline on it. If none leaks through past the seating valve is tight. If signs of a leak appear, however, the grinding must be continued.

Fig. 3—Grinding work can be done either by a plain screwdriver or a brace and bit



The English engineers posing for a group photograph shortly after their arrival in the United States

S.A.E. and I.A.E. on Lake Trip

(*Continued from page* 1155)

can sing, so it is necessary to recognize all of the essentials of such production before it can be realized. That is a great art—the knowing how to make an automobile.

It isn't being practiced in the making of cars today in Detroit. Old-fashioned common sense is worth more than all of the modern cost-keeping and efficiency methods today employed.

"Don't worry about your competitors," Mr. Leland told the engineers. "Show them the very best product which you are able to produce in your plant and tell them that if they can do better to do so for the good of all concerned. The automobile business is one of the greatest benefits of today and if we can in any way further its development we help all. If anyone wants to go anywhere and get back, he gets in an automobile and does it without the inconvenience of the steam cars or the other older methods of transportation. There is a demand in the United States alone for 30,000,000 automobiles and China is awakening.

Requirements for Manufacture of Ideal Car

"This is the answer to the question often asked as to the ultimate destiny of the automobile business. If you make a good car that sells itself, the public which is aroused by the advertising of all your competitors to the possibilities of automobiles in general, will buy your car. Let them create the demand and you give the public the car. How is the man who knows how going to make this ideal car? First, he must design a car which he believes to be the best to date. Then he must design for best speed over the roughest of roads and for reliability and comfort. Having all of these dissected, it is next necessary to decide upon the very best material of which each piece is to be made. Next comes the best machinery for each use and following that the best obtainable operators. Finally, these operators must be taught how to run this machinery at the best possible speed, so as to get the greatest speed for the accuracy desired, and the coarsest cutting speeds possible. After all this is accomplished there will be no need for inspectors.

"It costs less money to do high-grade work than it does to do cheap and sloppy work. Ideal production methods cannot be accomplished by militant organized workers, whose greatest aim is to see how they can get along without working."

Mr. Leland was not touching upon scientific management in his talk but said that he was dealing with the knowing how. This is the real thing, in addition to which it is necessary to have up-to-date machinery which you know is doing the best that can be done. Thus you get away from inspection, which is in the unproductive class. And you do not get any dividends out of the non-productive class. The right way is just as good as any other way.

In conclusion, Mr. Leland said that the more good automobiles which are made the better for all of the industry in general because the demand cannot be filled. One tour amidst the beauty spots without the handicaps of steam cars or boats is all that is needed to make the 30,000,000 prospects firm believers that they want cars. This is the reason they ought to have them.

"Only make them good ones."

Packard and Timken Axle Factories Visited

DETROIT, MICH., June 3—Today the program of instruction and entertainment for the visiting members of the I. A. E. and the S. A. E. included a trip in the forenoon through the plant of the Packard company and in the afternoon a visit of inspection to the works of the Timken Axle Co.

Leaving the hotel this morning at 9.30, the party was soon busily engaged in an interesting tour through the Packard factory. The works spread over an area of 37 acres. At the present time the factory is turning out twenty-one cars a day. Six of these are commercial cars and the remainder are divided among the different classes of passenger cars. A total yearly production of 3,000 cars is being made at the present time and of this number 1,800 are trucks.

The course through the Packard plant had been thoroughly mapped out in advance both literally and figuratively. Large white arrows painted on the ground showed each guide the route to pursue on the way through.

The assembly room in the building especially set up for jobs peculiar to truck work was the first visited. Here, the usual procedure of sending the chassis along the line was inverted. Instead, groups of specialized workmen went from chassis to chassis, each group doing the particular work to which they were accustomed.

The Packard company employs between 6,000 and 7,000 men and has a payroll amounting to $20,000 a day. There are 350 employees in the administration department alone. The welfare of the men has been taken care of in an extensive manner and the work done in this line was especially interesting to the English guests. A washroom is located in every department and a lunchroom on the grounds has a plant capacity of 1,500.

There is a doctor and an assistant constantly on hand and at the service of the men in case of accident. A hospital is located on the grounds and an ambulance and driver are in constant readiness.

The men work 52.5 hours a week. There is a single shift in all but two of the machining departments where it has been necessary to work nights to take care of the extra output due to the introduction of commercial cars in the line. The men are paid every 2 weeks and work 2 weeks ahead of the pay day. They are paid on the 15th of the month for work up to the first.

It takes 72 hours for a motor to pass through the assembling department. Rotating racks are used so that it is easy to work on the bottom of the motor by simply turning it over. While

the crankshafts are being assembled the shaft is turned over at 350 revolutions a minute by belt driver. This is done to assist in spotting the bearings before hand scraping them to fit.

The testing of the motor provoked considerable comment on account of its rigidity before the road test. The motors are mounted on blocks and direct connected to dynamometers. The 38 motors are required to develop from 40 to 48 horsepower at 1,200 revolutions per minute and the 48 motors must develop 60 horsepower at 1,200 revolutions per minute before they are allowed to go on the road test. Inspection tags are attached to the motors running on the blocks and the power developed at 1,200 revolutions per minute is indicated upon them. If they fail to come up to requirements they are sent back to the assembling department for overhauling.

The road test consists of a thorough run until the tester is satisfied with the behavior of the entire car. The test is never less than 4 hours and very often much longer.

The testing work throughout the plant was of extreme interest and many of the groups lingered longest at work of this nature. Hydraulic tests on the waterjackets are made before the cylinders are passed along for assembling. A 30-pound pressure is put upon them in an endeavor to discover any faults in the casting which may have been disclosed by the finish grinding work that each casting is put through.

The men in the machine shops work on the premium system and in general the limits are generous enough on the work so that it is possible for the men to make from full time and a quarter to time and a half. In cylinder grinding work, for instance on the finish grind, time and a quarter is made on a fifty per hour limit. After the trip through the factory was completed the party gathered at a luncheon tendered by H. B. Joy, the president and the other officers of the company; while the Packard band consisting of employees of the concern played on the lawn outside the office building where the luncheon was served. After the luncheon was over cheers were given for President Joy and the Packard company. President Browne, of the I. A. E., made a short speech of thanks and the party fell in behind the band and marched to the waiting cars.

Timken Factory Methods Examined

In a few minutes the visitors again found themselves passing through another factory of absorbing interest, this time that of the Timken axle works. Here, over 175 tons of product are turned out in a day. This part of the plant is solely intended for the axle work. The Timken bearing factory is in Camden, Ohio.

The factory in Detroit covers about 250,000 square feet of floor space.

In one day 130 sets of passenger car axles are manufactured and nine sets of commercial axles, making a total of about 280 axles a day.

A railroad siding which runs the entire length of the factory on one side brings the raw material to the factory, and at the shipping platform at one end of the plant another siding takes away the finished product.

One of the most interesting pieces of work in the factory which was noted by the visitors was the method of hardening just the desired parts of a gear or other part. The whole gear for instance, is electrically copper plated while it is still a blank. The gear is then cut and when put in the hardening bath only the unplated or cut part of the gear will be hardened on account of the protecting sheathing of copper which renders the gear immune at those points covered to the process.

Labor-saving devices are shown all over the factory. One good instance of this is the punching of the holes in the brake bands. This is done while the piece is straight. The machine at work while the visitors were passing through was punching forty-six holes at a time.

Other interesting pieces of machinery at which the English guests spent some interesting moments were the device for grinding the steering arm ball to a perfect sphere, the enormous shears for cutting the heavy stock, the gear cutting machines and hobbers and the milling machine for grinding the springpads and axle faces at one operation lasting about 2 minutes.

The heat-treating work was also a great feature of the visit to those interested in forge work. In a small office the man in charge signals the condition of the furnace to the men tending the fires. Three lights are used one above the other. A red one is placed at the top, a white in the center and a green below. When the temperature is right the white is lit, when too high the red and when too low the green. A log is kept showing how the temperature of each furnace varied during each 10-minute interval of the day.

Party Embarks for the Trip Up the Lake

DETROIT, MICH., June 4—*Special Telegram*—Dated on the dock. The party of American and English engineers to the number of 600 are just embarking for their session on the steamer City of Detroit. This morning the program included a visit to the Continental, Hudson and Chalmers plants, at each of which the guests were welcomed by the officer of the respective company. The party terminated at the Chalmers plant, where a luncheon was served and a quick return was made to the hotel and thence to the steamer.

The following 3 days will be spent on the boat, and they will afford ample opportunity for the engineers to take up the principal work, for which they have been called to convention. On Thursday, June 5, business and professional sessions will busy the members of the S. A. E. and their friends from across the pond, and this work will take up the morning as well as the earlier part of the afternoon, while later on the Soo will be reached. At 6 p. m. the boat will leave Sault Ste. Marie and proceed on the lake toward Mackinaw Island, reaching it on Friday at 2 p. m. The morning of that day will again be taken up by professional work, a number of papers being scheduled for reading. After a stop of 4.5 hours, Mackinaw Island will be deserted and the steamer will go on with its return trip to Detroit, arriving there at 3 p. m. on Saturday, after the morning has been spent in a professional session once more. At 10 p. m. another steamer will take the engineers to Cleveland and thence east.

Group of members of the English Institution of Automobile Engineers and of the American Society of Automobile Engineers

Factory Miscellany

Special machine used in the factory of the Hupp Motor Car Co., Detroit, Mich., for milling crankcases and gearboxes

THE machine shown in the above illustration is of special construction and is designed for milling crankcases and gearboxes. The machine is used in the factory of the Hupp Motor Car Co., Detroit, Mich. Hupmobile crankcases and gearboxes are cast in one piece of aluminum. The gearbox shown in the picture begins at the end of the curve surface. The milling of this curve was one time thought to be a very difficult operation, which would require four or five different machinings. The engineers of the Hupp company devised this special spool-shaped cutter which grinds the entire case, curve and all, in one operation. The machine turns out sixty pieces of work a day, one man only being required for its operation. It is continually in use and never torn down. The saving effected is five-fold, the single machining process doing away with five separate machinings. Where time is saved principally in this operation is in having the cutters made as they are, milling the supporting arms of the gearbox, the straight line surface and also the curve section. Without this combination curve it would be necessary to handle the case five different times for the same amount of work. One piece of work is handled at a time. The machine occupies an area of about 36 square feet. It is standard No. 4 miller, the only special feature being the design of the cutters and the method of handling the job.

RUBBER Factories in Brazil—An impetus is to be given the automobile trade in all parts of South America by the establishment of rubber manufacturing plants in Brazil. In Brazil tires will be retailed considerably cheaper than in any other country. Other countries will profit by the lower freight charges. In addition to the Goodrich Tire and Rubber Co., Akron, O., which has a government contract for the erection of a factory and a washing plant, other firms will engage in rubber manufacturing.

Rubber Reclaiming Co.'s Plant—The United States Rubber Reclaiming Co., Buffalo, N. Y., recently filed plans for the construction of a factory to cost $2,000.

Gramm Plant Enlarged—The Gramm Motor Truck Co., Lima, O., will be enlarged this summer. It is the intention to increase the capacity to fifty trucks daily.

Goodyear Advertises for Workmen—The Goodyear Tire & Rubber Co., Akron, O., is advertising in Eastern newspaper for 2,000 working men, for its tire factory in Akron.

Universal Starts Factory Construction—The Universal Motor Truck Co., Detroit, Mich., recently incorporated under the laws of Delaware with a capital stock of $1,200,000, has begun the erection of a new factory adjoining its present plant and fully as large to cost, without machinery, $250,000.

Morgan & Marshall Awards Contract—The Morgan & Marshall Co-Operative Rubber & Tire Co., East Liverpool, O., has awarded the contract for the construction of a plant 90 by 107 feet. The work of construction will be started at once. The company will manufacture automobile and motorcycle tires.

Schachts Looking for Plant—G. A. Schacht and W. C. Schacht, formerly manufacturers of the Schacht automobile, Cincinnati, O., will re-enter the automobile business, and are looking for a factory they can buy. As soon as one is obtained equipment will be installed and work started making motor trucks.

Davenport Firm Is Reorganized.—A complete reorganization of the Western Implement and Motor Co., a $2,000,000 concern organized in Davenport, Ia., over a year ago, was recently announced. The company will continue its manufacturing operations at the plant at Davenport until October 1, when the company will move to Cedar Rapids. This city made a flattering offer, which was accepted. The company will be given a $60,000 plant and a tract of 10 acres. The new plant will be completed about October 1.

Gramm to Build—The Gramm Motor Truck Co., Lima, O., will make important extensions to its plant in the near future.

Dominion Tire's $50,000 Building—The Dominion Tire Co., Berlin, Ont., has decided to erect a power house addition to cost $50,000, to be ready for operation in December.

Goodyear Factory in Seattle—The Goodyear Tire & Rubber Co., Akron, O., has commenced the construction of an elaborate factory building in Seattle, Wash. It will have a total floor area of 10,000 square feet.

Cole Doubling Production—The future production figures for the Cole Motor Car Co., Indianapolis, Ind., will double. A $150,000 addition to the present plant on East Washington street will be built, and the organization generally enlarged.

Dreadnought Tire's New Plant—The Dreadnought Tire & Rubber Co., Baltimore, Md., recently incorporated to manufacture rubber tires for automobiles, has secured a plant at Orangeville, Baltimore County, for its factory. The site has four acres of ground on which are seven buildings. Work will be started at once in rebuilding the Wilms plant so that the manufacture of rubber tires can proceed as soon as possible.

Four Wheel Drive's Factory—The Four Wheel Drive Automobile Co., Clintonville, Wis., has awarded contracts for the construction of factory No. 3, the largest addition to its plant, which is to be ready for occupancy July 1. After completion work is to be commenced on factory No. 4, which will be 100 by 120 feet, and similar to factory No. 3. A 40 by 40 foot house is also to be erected soon. The improvements will cost $75,000.

Pierce-Arrow's L. I. Building—The new service building now being erected at Freeman and Fifth avenues, Long Island City, for the Harrolds Motor Car Co., distributor of the Pierce-Arrow automobiles, has been completed as far as the steel work and the filling in of bricks and concrete has been commenced. The front of this building will be of gray brick with red and brown trimmings. The first floor will be 200 feet square owing to a one-story extension, while the remaining floors will be 80 by 200 feet. A smaller building, 50 by 100 feet, is being erected adjoining the main building, which will be used as a tin shop. This building is to be equipped with electrical apparatus the equal of that in the Ford building. The power equipment will total about 175 horsepower and in addition to the lighting and operating there is to be a fire apparatus which will be equipped with a 75-horsepower motor. In this plant at least 200 men will be employed when the building is completed, which will be about the middle of the summer.

Ford's L. I. Plant—The alterations to the Ford Motor Bldg., at Honeywell street and Jackson avenue, Long Island City, are about completed and this concern now has about 100,000 square feet of floor space which will be used entirely by the company for the assembling of cars. Parts will be shipped to that city from the Detroit, Mich., factory and about 150 more men than at present will be put to work in the assembling. It is proposed to assemble from fifty to sixty cars a day. One of the features of this plant is the use that will be made of electricity. Instead of the space given over to boilers and engines and the big smoke stacks that would ordinarily be found in a plant of this size, they are replaced by electric motors totaling 125 horsepower which will be used to drive elevators, air compressors and machine tools. On the roof is also to be erected a large electrical sign. This company recently completed the purchase of the entire block bounded by Honeywell street, Fifth avenue and Jackson avenue, and will shortly commence the erection of a ten-story building adjoining the present plant, which has been raised to eight stories.

New factory addition of the Sanford Motor Truck Co., Syracuse, N.Y.

Shows, Conventions, Etc.

June 2-7..... Racine, Wis., "Made in Racine Exposition," J. I. Case Co.'s foundry.
June 5, 6, 7..... Detroit, Mich., Midsummer Meeting of Society of Automobile Engineers.
October 13..... Philadelphia, Pa., National Fire Prevention Conference, Philadelphia Fire Prevention Commission.
December 9-12..... Philadelphia, Pa., Annual Convention of American Road Builders' Association.

Race Meets, Runs, Hill Climbs, Etc.

June 5..... New York City, Orphans' Day Picnic at Glen Island, Orphans' Automobile Day Assn.
June 7..... Philadelphia, Pa., Inter-Club Reliability, Quaker City Motor Club, Automobile Clubs of Delaware County, Philadelphia and Germantown.
June 10..... Columbus, O., Reliability Run, Columbus Automobile Club.
June 14..... Cincinnati, O., Hill Climb, Cincinnati Auto Dealers.
June 14-15..... San Francisco, Cal., Track Races, E. A. Moross.
June, 16, 17, 18... Columbus, O., Reliability Contest, *Ohio State Journal*,
June 19..... Chicago, Ill., Algonquin Hill Climb, Chicago Motor Club
June 21..... Cincinnati, O., Hill Climb, Cincinnati, O., Automobile Dealers.
June 21..... Philadelphia, Pa., Fletcher Cup Run, Automobile Club of Philadelphia.
June 21-22..... San Francisco, Cal., Track Races, E. A. Moross.
June 23..... Des Moines, Ia., Little Glidden Tour, Iowa Automobile Assn.
June 25-28..... Chicago, Ill., Non-Motor-Stop Reliability, Chicago to Boston, Chicago Automobile Club.
July 1..... Indianapolis, Ind., Tour of Indiana Automobile Manufacturers' Assn. to the Pacific Coast.
July 1-16..... Winnipeg, Man., Motor Plow Competition, Dr. A. W. Bell, Manager.
July 4..... Columbus, O., 200-Mile Track Race, Columbus, O., Automobile Club.
July 4..... Taylor, Tex., Track Meeting, Taylor Auto Club.
July 4..... Washington, D. C., Track Races, National Capital Motorcycle Club.
July 4-5..... Sioux City, S. Dak., Track Meetings, Sioux City Automobile Club and Speedway Assn.
July 5-6..... Tacoma, Wash., Road Race, Montemara Festa Automobile Committee.
July 8-16..... Winnipeg, Man., Midsummer Exhibition, A. C. Emmett, Manager.
July 11..... Twin City, Minn., National Reliability Tour, A. A. A.
July 20..... Seattle, Wash., Track Races, E. A. Moross.
July 27..... Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
July 27-28..... Tacoma, Wash., Tacoma Road Races.
July 28-29-30..... Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 5..... Kansas City, Mo., Sociability and Endurance Run from Kansas City to Colorado Springs, Col., Kansas State Automobile Assn.
Aug. 12..... Kansas City, Mo., Reliability Tour, Kansas State Auto Assn.
Aug. 29-30..... Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug. 30-Sept. 6.... Chicago, Ill., Reliability Run, Chicago Motor Club.
Sept. 1..... Columbus, O., 200-Mile Track Race, Columbus Auto Club.
Sept. 9..... Corona, Cal., Track Race, Corona Auto Assn.
Oct. 4-11..... Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Nov. 24..... Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27..... Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign.

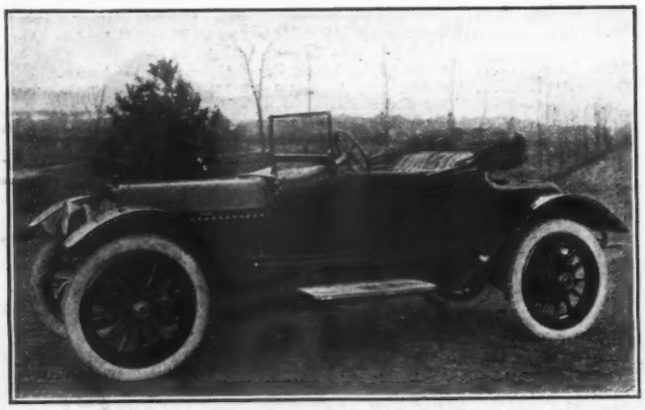
June 3-7..... London, Eng., Third International Road Congress, Rees Jeffrey, General Honorary Secretary.
June 23-28..... London, England, International Road Congress.
July 12..... Amiens, France, Grand Prix Race.
July 13..... Paris, France, French Grand Prix Cyclecar Race.
July 15-30..... London, Eng., Olympia Heavy Motor Vehicle Show.
July 18-26..... London, Eng., Imperial Motor Transport Conference.
Aug. 28-30..... Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent International Exhibition.
Sept. 21..... Boulogne, France, 3-Litre Race.
Sept. 25..... Isle of Man, International Stock Car Race.
October ..... Paris, France, Automobile Show, Grand Palais, 10 days.
November ..... London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Engineer — Dealer — Repairman — Garage

KisselKar patent combination uniform pressure street flusher and sprinkler, which has a 1,000-gallon galvanized steel tank

Showing the KisselKar sprinkler used as a flusher. Both the flusher and sprinkler are operated by hand levers



New model of the Locomobile Co. of America, Bridgeport, Conn., called the gentleman's roadster

NEW KISSEL SPRINKLER—The Kissel Motor Car Co., Hartford, Wis., is putting out a motor-driven sprinkler, as illustrated above. The vehicle consists of a 1000-gallon galvanized steel tank mounted on a regular 3-ton chassis. Pressure is produced by taking water by gravity from the bottom of the tank into two stage centrifugal pumps directly connected to the motor. Pressure can be had from 20 to 60 pounds, according to the speed of the motor. The water is forced from the pump into distributing pipes and out through two pipes to sprinkling attachments of vehicle type. The same pressure may be had when tank is partially full as when full, making it possible to get the benefit of all the water contained in the tank. The sprinkler will sprinkle the full width of a 60-foot street from curb to curb, or can be closed down to 20-foot streets. One tank of water will sprinkle 7 to 8 blocks of 50-foot roadway, or will flush a distance of 3.5 blocks.

POPE MOVES IN ATLANTA—L. S. Crane, Atlanta, Ga., agent for the Pope-Hartford automobile, has moved to 328 Peachtree street.

SHAW WITH EMIL GROSSMAN—G. E. Shaw has joined the technical staff of the Emil Grossman Co., New York City, as mechanical engineer.

WAITE NEW OAKLAND MANAGER—G. S. Waite has taken up the management of the Oakland Motor Car Co., 1600 Broadway, New York City.

REPUBLIC DAYTON DISTRIBUTOR—The Reliable Tire & Repair Co., Dayton, O., will act as the distributor for the Republic line of tires in that territory.

HARVEY SALES MANAGER—C. H. Harvey has been appointed sales manager of the Eastman Motor Car Co., Philadelphia, Pa., agent for the Wilcox truck.

BARDEN KELLY-SPRINGFIELD SECRETARY—G. W. Barden has been appointed secretary and treasurer of the Kelly-Springfield Motor Truck Co., Springfield, O.

FISK BRANCH IN HOUSTON—The Fisk Rubber Co. of Texas will open a branch in Houston. Three stories at 1305 Main street have been leased. C. B. Johnson will be in charge.

WALLACE FRISCO SALES MANAGER—W. D. Wallace has assumed his duties as the sales manager of the San Francisco, Cal., branch of the Franklin Automobile Co., Syracuse, N. Y.

METZ OPENS N. Y. QUARTERS—The Metz Automobile Co., Waltham, Mass., has opened temporary salesrooms on the second floor at 1700 Broadway. R. L. Rieser is manager.

AUGIER DIES IN PARIS—Albert Augier, general manager of the Paris branch of the Goodrich Tire Co., Akron, O., died at his residence recently as the result of a self-inflicted wound.

BATAVIA'S BUFFALO BRANCH—The Batavia Rubber Co., Batavia, N. Y., has opened a factory branch at 1030 Main street, Buffalo, N. Y., where its pneumatic tires will be carried in stock.

MOTOR OMNIBUSES FOR PHILADELPHIA—The Philadelphia Rapid Transit Co., Philadelphia, Pa., contemplates the installation of motor omnibuses on Broad and other streets not containing trackage.

EAST LIVERPOOL'S FIRE TRUCK—The city council of East Liverpool, O., has adopted a resolution appropriating $5,000 for the purchase of a combination motor-driven fire truck for the municipality.

BUS LINE IN TORONTO—A motor bus line is proposed in Toronto, Ont. The busses would be run as auxiliary to the street railway service as in Montreal, and other large cities. Buffalo, N. Y., also soon is to have the motor bus line.

VESTA ACCUMULATOR'S NEW QUARTERS—A lease for 10 years on a new building to be put up at 3024 Locust street, St. Louis, Mo., was recently made by the Vesta Accumulator Co., Chicago, Ill. The building is being erected and will cost $10,000.

TIMES SQUARE CO. ADDS—The Times Square Auto Co., New York City, has filed plans to immediately erect two additional stories on its present quarters at 56th street and Broadway. Each floor will have an area of 20,000 square feet, which will give it a total space increase of 40,000 square feet.

NEW PIERCE-ARROW FEATURES—The Pierce-Arrow Co., Buffalo, N. Y., is now using an electric self-starter instead of its former air system. It is now placing its headlights on the front and mudguards instead of as heretofore on brackets either side of the radiator.

PEUGEOT OPENS NEW YORK OFFICE—The Peugeot car which won the 500-mile race at Indianapolis, Ind., last week is now represented in New York City, A. G. Kaufman having taken the agency for this country with offices at 1620 Broadway. Henry Taylor is sales manager.

BY WAY OF CORRECTION—In the issue of May 29 in the lead article named Indianapolis, a typographical error was made by stating the first electric vehicle built by the Waverley Co., Indianapolis, Ind., was delivered to Charles Finlay Smith in 1907. This should have been 1897.

POTTER SEERS VANDEWATER CONNECTIONS—M. H. Potter has severed his connection with Vanderwater & Co., Elizabeth, N. J., manufacturer of the Correga cars. He has connected with a new company in Montreal, Que., and will continue along the same lines, but in a broader field.

LARGE MILWAUKEE GARAGE LEASED—The garage of the Kopmeier Motor Car Co., of Milwaukee, Wis., considered the largest in the Northwest, and situated at 375 Summit avenue, has been leased for a long term of years by Hustis Bros., representing the Stevens-Duryea and Borland electric.

FIVE AMBULANCES MOTOR DRIVEN—With the installation of the fifth motor-propelled ambulance at the charity hospital in New Orleans the last of the horse-drawn wagons of this type have been withdrawn from the service. In the future only motor-driven ambulances will be maintained by this big institution.

KISSEL SERVICE STATION IN FRISCO—The Pacific KisselKar branch is having plans drawn and will soon break ground for a new sales and service building to be located on Van Ness avenue. It is intended to erect a structure that will eclipse in size the service station in Chicago, Ill., which contains 70,000 square feet of floor space..

YALE MFG. CO. BANKRUPT—The Yale Mfg. Co., of Oostburg, Wis., manufacturing automobile accessories and specialties, has filed a voluntary petition in bankruptcy, giving its liabilities at $27,272.76 and assets at $29,326.95. The company was organized about 3 years ago by Milwaukee capital established a workshop at Oostburg.

NEW SERVICE STATIONS—The Pope Hartford Co. of Boston, Mass., and the Republic Motor Co. of Massachusetts, the latter handling the Little and Chevrolet cars, have had to get new service stations in Cambridge, the former adding a new building to its present one and the other company leasing 10,000 square feet in the Shoe & Leather Bldg.

PRICE DUNLOP MANAGER DIES—Hubert Price, general manager of the French Dunlop Tire Co., dropped dead in the streets of Paris recently. He was an Englishman and 41 years of age, came to Paris about 20 years ago to fill a position with the Clement Cycle Co. He later joined the Dunlop Co., and after a short period was appointed general manager.

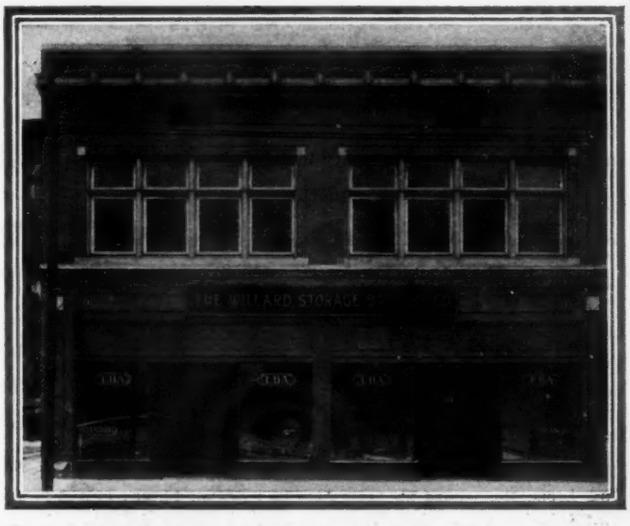
ORPHANS' DAY, JUNE 11—Secretary Chester I. Campbell of the Boston Automobile Dealers Association, Boston, Mass., has selected Wednesday, June 11, as the day on which to give the blind, crippled and orphaned children an outing. More than 400 cars will be used and the youngsters will be taken to Nantasket beach instead of to Sharon as formerly.

TOP CO. IN BANKRUPTCY—Zimmerman & Son, Waupon, Wis., manufacturers of tops, curtains, cushions, etc., and in business for 47 years, have filed a voluntary petition in bankruptcy. The property will be sold June 7 to satisfy the demands of creditors. It is said that the failure of an automobile manufacturing company which owed the Zimmerman concern a large sum for material and finished goods, was the indirect cause of bankruptcy.

CORNING ORDERS FIRE APPARATUS—Corning, N. Y., placed an order recently with the American-La France Fire Engine Co. of Elmira, N. Y., for a new motor six-cylinder fire pump and new motor combination chemical and hose wagon, two apparatuses to cost $14,500. The Elmira fire engine concern agrees to sell Corning's horse-drawn vehicles and turn over proceeds to the Corning department, which will be used toward purchase of the new motor wagons.

GERMAN SALES INCREASE IN BRAZIL—Increasing sales of German cars in Brazil is declared to be due to the fact that full lines of repair parts are carried in stock by the agents of the German manufacturers. American cars are popular, but parts can be obtained only by sending to the United States. Government statistics for 1912 show that 2994 cars of European manufacture entered the republic, while 783 American cars were received. Those familiar with conditions declare that the proportion could be reversed if the business was intelligently nursed for a year or two by American manufacturers.

Wreck of an automobile caused by Nebraska's second tornado on May 14. Automobile firms and owners in Nebraska are considered lucky, for very little damage was reported to automobiles. Seward was the principal scene of the most damage and loss of life. Here eight people were killed, twenty injured and a property loss of $100,000 was recorded. The automobile in the above illustration was taken from a private garage and deposited about 100 feet, and another machine was blown into its place in the garage without suffering serious damage



Detroit, Mich., branch of the Willard Storage Battery Co., Cleveland, O. This branch is in charge of M. G. Hillman

Ascent of Grassy Alp, about 40 miles outside of Detroit, Mich., made by a Studebaker car

MACNEIL HEADS EXCELSIOR RUBBER—W. N. Macneil is now heading the Excelsior Rubber & Supply Co., Winnipeg, Ont.

NEW BUICK BIRMINGHAM SALESROOMS—New salesrooms have been opened by the Buick Agency in Birmingham, Ala. The new quarters are expensively appointed. The new site is at Avenue D and 20th street.

RACINE ADDS FIRE APPARATUS—The common countil of Racine, Wis., has confirmed the action of its committee awarding the contract for furnishing two motor-propelled fire engines to the American-La France Fire Engine Co., of Elmira, N. Y., at $17,000.

MORE FREIGHT CARS ORDERED—The Great Northern road has ordered 1500 automobile freight cars. Altogether three northwestern roads will spend $25,000,000 for new rolling stock and the Great Northern's proportion is $16,000,000. The company will buy altogether 9,050 cars.

AUTOMOBILE MAIL SERVICE IN ARGENTINA—Mail and passengers are to be carried on a new automobile line from Rosario, Argentina, to several small places in the interior. Four cars will be used in the service, which will maintain schedule. The government pay for the mail is sufficient to cover the expenses of operation. The returns from the passenger business are expected to be sufficient to cover the interest on the investment and leave a fair profit to the owners.

NEW HOME FOR CHALMERS—The last lot of land on Commonwealth avenue, Boston, Mass., between the buildings occupied by motor concerns and the parkway that was vacant has been sold and upon it will be erected salesrooms and service stations, one of which will be occupied by the Whitten-Gilmore Co., that handles the Chalmers line in Boston, as well as the Federal and Standard trucks and the Woods electric, and the other is said to be leased to the Franklin agency.

AUTOMOBILES IN URUGUAY—Few South American cities, in proportion to the number of inhabitants, show as many automobiles in use as Montevideo, yet the number is increasing very considerably. During December and January no less than 115 high-priced cars entered this port and were sold. There are more than 1,300 cars licensed in Montevideo, about 2,000 being the total for the whole republic. Of the machines in use there, those of American manufacture are well represented, numbering about one-half of the total.

CO-OPERATIVE MOTOR BUS SERVICE—A co-operative motor bus service modeled after the system in force at Indianapolis, Ind., is proposed for Milwaukee, Wis., by leading grocers and marketmen. The plan includes the issue of 5,000 shares of stock, with a limit upon the number that may be held by any one member, and provides for an initial service of 12 trucks. It is planned to give the consumer complete control of the service by an arrangement of the sale of stock, and to divide profits equally among stockholders. Merchants along any main thoroughfare may organize a company on the same basic principle, in which every citizen with $10 to invest may become a stockholder and thus part owner of a passenger bus, increasing his or her chances for a dividend every time the person rides on one of the busses. J. A. Bayliss is promoting the scheme in Milwaukee.

NEW LA FRANCE GARAGE—The La France Garage Co., Elmira, N. Y., has completed its plans for the new building and garage at Church and Baldwin streets, and the builders are ready to begin construction as soon as the small buildings have been removed from the property. The new building will be four stories in height, with a basement. The exterior is to be of white brick. The construction will be brick and concrete. The building will be of L shape, 60 feet front on Church street, 116 feet deep on Baldwin street, with a wing extending east from Baldwin street, 41 feet wide and 120 feet deep, extending in the rear of a brick apartment house. The second floor of the building will be used for second-hand cars. The third floor will contain the repairs department, and the fourth floor will be a paint and finishing shop. The basement will be for temporary storage and the charging of electric cars and trucks.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BOSTON, MASS.—W. J. Connell Co.; capital, $15,000; to deal in automobiles. Incorporators: W. J. Connell, H. D. Greene, H. J. Cramp, I. E. Thomson.

BROOKLYN, N. Y.—Barber Auto Service Co.; capital, $10,000; to deal in automobiles. Incorporators: William Barber, A. S. Barber, M. F. Barber.

CHICAGO, ILL.—Divine Motor Car Co.; capital, $10,000; to deal in automobiles. Incorporators: E. C. Divine, H. E. Campbell, W. R. Mitchell.

CLEVELAND, O.—H. & H. Auto Co.; capital, $10,000; to manufacture and deal in automobiles. Incorporators: F. M. Fogarty, J. O. Fordyce, A. B. Brackenridge, H. M. Reidel, G. M. Dolan.

DETROIT, MICH.—Universal Motor Truck Co.; capital, $1,200,000; to manufacture motor trucks.

JERSEY CITY, N. J.—Hudson & Bergen Automobile Co.; capital, $135,000; general automobile business. Incorporators: R. E. Fulcher, C. Moller, A. A. Leets.

MANITOWOC, WIS.—L. J. Anderson Co.; capital, $20,000; to deal in farm machinery, gasoline engines, automobiles, tractors, and similar prime movers. Incorporator: L. J. Anderson.

MAYSVILLE, KY.—Brown Auto Co.; capital, $4,500; to manufacture automobiles. Incorporators: Mike Brown, W. B. Tully, S. M. King.

NEW YORK CITY—Asch & Co.; capital, $1,000; to deal in automobiles. Incorporators: B. M. Asch, Leonard Veith, W. M. Goldsmith.

NEW YORK CITY—Gadabout Motor Corp.; capital, $250,000; to deal in automobiles, motors, etc. Incorporators: A. V. Clarke, Charles Vail, D. E. Dealy, Jr.

NEW YORK CITY—H. S. Houpt; capital, $60,000; to deal in automobiles. Incorporators: L. A. Van Patten, I. H. Westervelt, L. W. Bagley.

NEW YORK CITY—Universal Equipment Co.; capital, $50,000; to deal in internal combustion engines and motors. Incorporators: George Gray, T. W. Hatfield, I. B. Owens.

ST. LOUIS, MO.—Grand St. Louis Auto Co.; capital, $4,000; to deal in automobiles. Incorporators: L. B. Scherer, E. A. Stosberg, J. J. Scherer.

SYRACUSE, N. Y.—Syracuse Auto Radiator Co.; capital, $50,000; to manufacture automobile radiators. Incorporators: Max Kalman, Mrs. Minnie Kalman.

WHEELING, W. VA.—Union Automobile Co.; capital, $25,000; to deal in automobiles and accessories. Incorporators: W. T. Shaffer, A. C. Shaffer, A. M. Schenk, G. P. Fahnar, B. J. Smith.

WHEELING, W. VA.—Auto Supply House; capital, $25,000; to deal in automobiles. Incorporators: H. W. Rogers, T. A. Westmyer, J. P. Arbenz, Minnie Rogers, Anna B. Westmyr.

GARAGES AND ACCESSORIES

ANTIGO, WIS.—Holland Flexible Auto Wheel Co.; capital, $10,000; to manufacture a new type of wheel for motor trucks. Incorporators: T. J. Holland, J. L. Donahue, J. E. McKenna.

BUFFALO, N. Y.—Easy Starter & Speeder Sales Co.; capital, $1,000; to manufacture automobile self-starters. Incorporators: F. A. Coon, H. J. Schopf, J. E. Schuesler.

CANTON, O.—Reliable Puncture Seal Co.; capital, $25,000; to deal in automobile accessories. Incorporators: L. W. Steinmetz, W. V. Baird, P. S. Wise, J. R. Binns, E. D. Myers.

CINCINNATI, O.—K. Auto Delivery Co.; capital, $10,000; to do a general automobile trucking. Incorporators: Edward Konker, G. W. Bell, Anna Konker, Gus Konker, F. Schmidt.

CLEVELAND, O.—Air Tank Carbureter Co.; capital, $10,000; to manufacture apparatus for the generation or mixing of gas for power or light. Incorporators: Edward Younder, L. C. Loomis, F. Castle, W. J. Engel, James Kelly.

CLEVELAND, O.—Cleveland Ball Bearing Co.; capital, $10,000; to manufacture and deal in ball bearings and other parts for automobiles. Incorporators: Henry Merkel, G. M. Merkel, P. J. Probeck, W. A. Crawford, C. H. Warner.

NEW YORK CITY—Lake Sales Co.; capital, $25,000; to deal in piston rings. Incorporators: H. S. Lake, J. A. Walker, R. B. Wasson.

NEW YORK CITY—Triumphant Tire Society; capital, $500; to deal in tire, rubber goods, etc. Incorporators: E. R. De Tamble, Louise Bennett, E. A. Swanson.

NORFOLK, VA.—Auto Specialty Co.; capital, $25,000; to deal in automobile accessories. Incorporators: T. G. Coburn, F. D. Belote, I. B. Belote.

PHILADELPHIA, PA.—National Tire & Rubber Co.; capital, $50,000; to manufacture automobile accessories. Incorporators: Harry Fisher, Benjamin Haas, Louis Greenhalt, J. G. Hughes, H. W. Davis.

TOLEDO, O.—Babcock Garage Co.; capital, $10,000; to operate a garage and do repair work. Incorporators: C. Wagenhauser, L. P. Wagenhauser, A. G. Der, Bernard Hubert, C. F. Souder.

WICHITA, KAN.—Hockaday Auto Supply Co.; capital, $15,000; to deal in automobile supplies. Incorporators: Ray Hockaday, F. W. Hockaday, C. E. Hockaday, James Pryune, F. W. Martin.

WILMINGTON, DEL.—Bernstein Automobile Accessories Sales Co.; capital, $15,000; to construct, maintain and operate machinery and devices for cleaning windows.

WORCESTER, MASS.—Electro Signal Co.; capital, $50,000; to manufacture an automobile signal. Incorporators: W. M. Waite, J. H. Wheelock, Zella E. Wheelock.

CHANGES OF NAME AND CAPITAL

DETROIT, MICH.—Maxwell Motor Co.; capital increased from $31,000,000 to $37,000,000.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Bay City, Mich.	Cole	Miller Auto Co.
Bennington, Vt.	Cole	B. A. Quinlan.
Birmingham, Ala.	Cartercar	A. J. Arrant.
Cedar Rapids, Ia.	Franklin	A. D. Wood.
Danville, Va.	Cole	B. L. Taylor.
Des Moines, Ia.	Chevrolet	Chevrolet Little Motor Co.
Great Falls, Mont.	Cole	Dr. J. A. Niles.
Haverstraw, N. Y.	Franklin	J. W. Gillies.
Houston, Tex.	Apperson	Apperson Auto Co.
Houston, Tex.	Pullman	Apperson Auto Co.
Joplin, Mo.	KisselKar	Lyscio & Walker.
Lewistown, Mont.	Cole	S. C. Weaver.
Logan, O.	Detroiter	Hocking Valley Auto Co.
Mason City, Ia.	Cole	C. J. Murray & F. D. Daniels.
Milwaukee, Wis.	White	White Automobile Co.
Montpelier, Vt.	Cole	Lane Mfg. Co.
New York City	Metz	Metz Automobile Co.
Oakes, N. D.	Kissel Kar	J. E. Bush.
Racine, Wis.	Reo	F. E. Foster & F. H. Weichert.
Salem, Ind.	Cole	C. M. Crim & Son.
San Francisco, Cal.	Ames	Ames Motor Sales Co.
Seattle, Cal.	Metz	J. P. Scearde & W. Matheson.
Setucket, L. I.	Franklin	A. Pfeifer.
Sheffield, Mass.	Cole	A. H. Tuttle.
Stamps, Ark.	Cole	J. M. Hudgens.
St. Cloud, Minn.	KisselKar	Menec & Bisenius.
St. Louis, Mo.	Stutz	Lane-Lynch Motor Car Co.
York, Pa.	Krit	Southern Penn. Auto Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Asbury Park, N. J.	Stewart	Seacoast Garage Co.
Baltimore, Md.	Dart	G. A. Wehr.
Boston, Mass.	Dart	W. F. Magill.
Boston, Mass.	Hercules	M-B-M Co.
Butler, Pa.	Dart	A. C. Hileman.
Colchester, Ill.	Dart	Colchester Auto Co.
Fort Worth, Tex.	Dart	Mayer & Strickland.
Green Bay, Wis.	Best	DuBois, Haevers & Co.
Lockport, N. Y.	Stewart	C. L. Papworth.
Los Angeles, Cal.	Jeffery	W. K. Cowan Co.
Luxemburg, Mo.	Palmer-Meyer	Louis Schnellman.
Mattese, Mo.	Palmer-Meyer	H. J. Jenneman.
Maxwell, Mo.	Palmer-Meyer	C. J. Siedler.
Newark, N. J.	Chase	Chase Motor Truck Co.
Newburg, N. Y.	Dart	C. H. Bellinger.
Salt Lake City, Utah	Dart	Inter-Mountain Transportation Co.
Marietta, O.	Standard	F. R. Hall.
Philadelphia, Pa.	Rauch & Sang	Peerless Motor Car Co.